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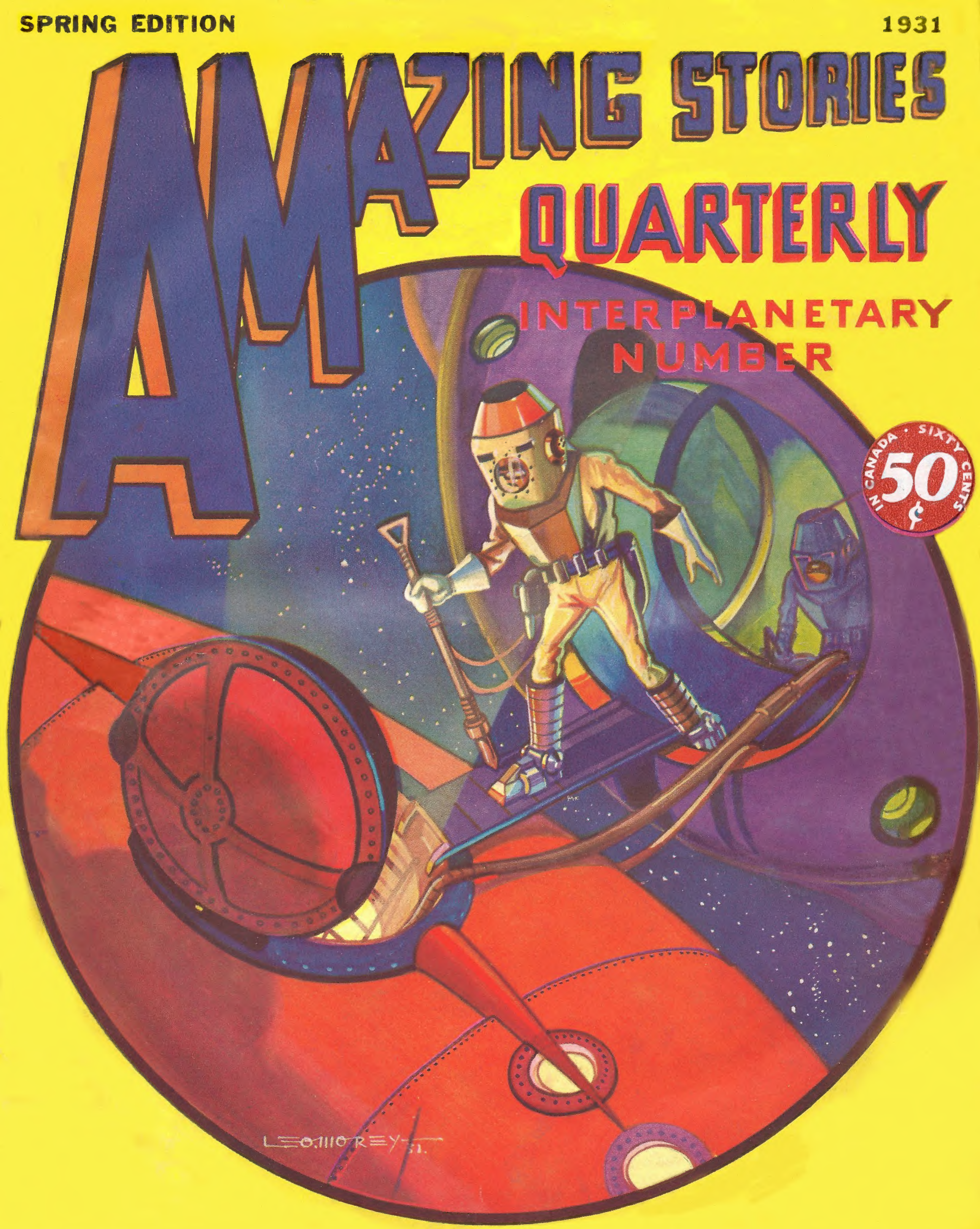

ISLANDS OF SPACE, by John W. Campbell, Jr.

Isaac R. Nathanson — Harl Vincent

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VOL. 4—NO. 2
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Our Cover

This issue depicts a scene from the story entitled, "The Invisible Ships," by Harl Vincent, in which an enemy Martian is shown coming into the disabled space ship from earth, the entire crew of which ship is paralyzed by the rays of the Martians.

Cover Illustration by MOREY

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Islands of

WHEREAS atomic power is not yet a thing of actuality, but rather a much hoped for future realization, our young author goes beyond this still necessarily limited power. Says Mr. Campbell, there is tremendous power in the cosmos. Why limit ourselves to the mere atom as a source of power? But even his imagination, accustomed as it is to conquering vast space—even beyond our galaxy, seems somewhat appalled at the prospect of some day learning the secret of cosmic power.

Arcot, Morey, their respective fathers, and Wade are characters well known to a good many of our readers—and well liked. But that is the only relationship between "Islands of Space" and Mr. Campbell's previous stories. You cannot afford to miss this novel-length classic of science fiction. It is the best story by this author that has been published thus far.

THREE young men sat in animated conversation around a table piled high with sheets of graphs, sketches of mathematical functions, and books of tensor formulae. Beside the table stood a compact Munson-Bradley integraph with seventeen graph positions, to which they frequently referred their work, checking the equations that they had already derived. These results seemed to surprise even this trio, a group which had introduced more innovations than any three men in the system's history.

Suddenly the low hum of the annunciator interrupted their conversation.

"That's Fuller," said one, rising and walking to the televisophone. He snapped the switch into position, and the grey screen at once misted with color, then a sharp picture leaped out on its dull surface.

"Arcot speaking."

"Dr. Arcot," replied the man whose face was imaged in the screen, "Mr. Fuller is here, and though I know you want to see him, standing orders say I must call you up. It's all right, is it not?"

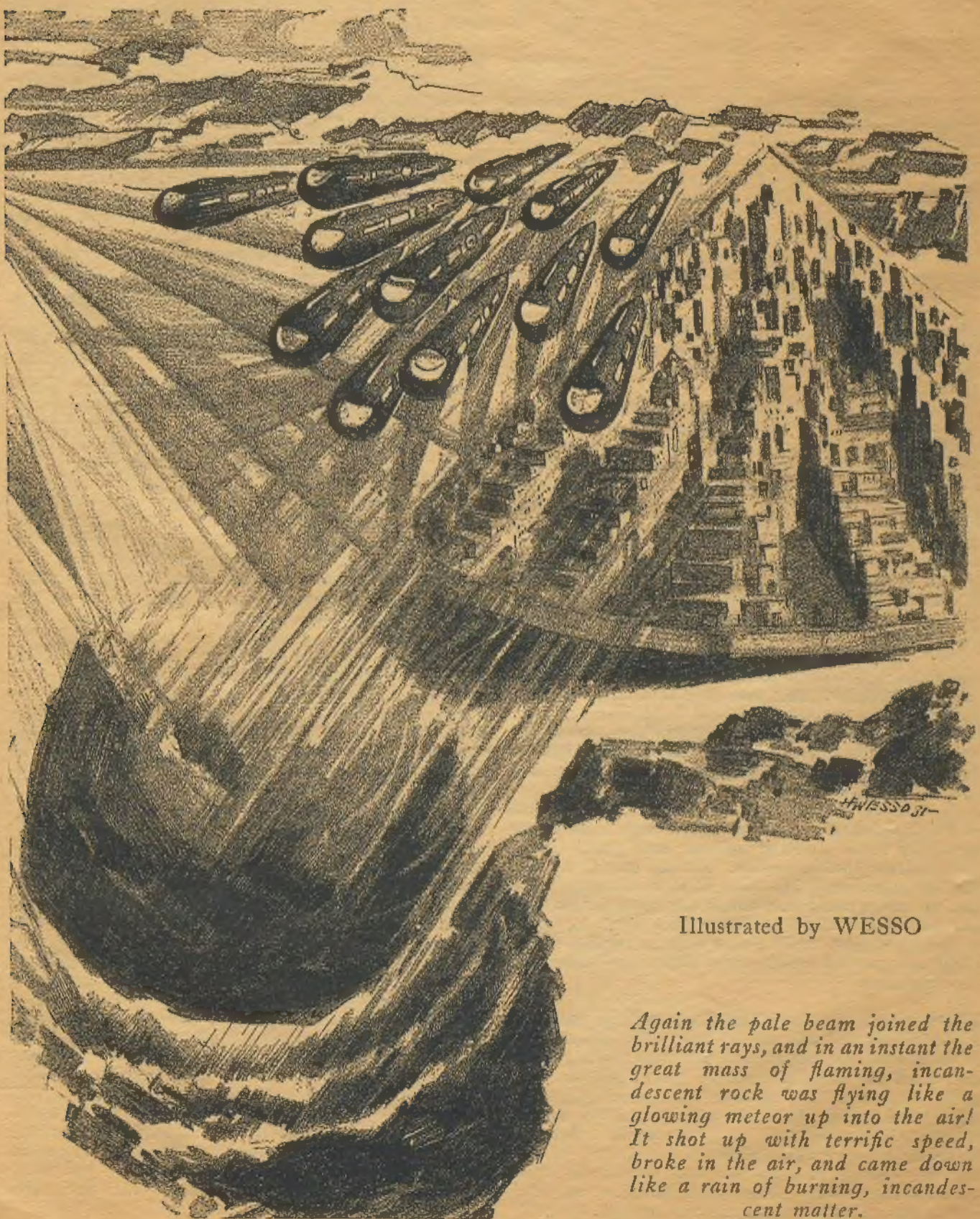
"Yes—send him up. And now remember, I am not in to anyone but Dad, Mr. Morey senior, or the Interplanetary Chairman, and don't call if they come—send 'em up, I'm not answering. You detectives are sometimes too efficient," smiled Arcot. "Don't call me up for the next ten hours."

"I'll see to it, Dr. Arcot," smiled the image in the disc. "You won't be bothered, I promise."

There was a dull click in the small loudspeaker as the circuit was broken, and the disc faded. There was a mounting hum coming from the corridor now, as the high-speed elevator completed its vertical journey of seventy-four stories. Arcot walked leisurely to the door, and as Fuller's light step sounded on the artificial rubber floor, he opened the door.

Space

By
John W. Campbell, Jr.
Author of "The Metal Horde," "Solarite," etc.



Illustrated by WESSO

Again the pale beam joined the brilliant rays, and in an instant the great mass of flaming, incandescent rock was flying like a glowing meteor up into the air! It shot up with terrific speed, broke in the air, and came down like a rain of burning, incandescent matter.

"Hello, Fuller—what happened to you? Did you wait to come by airplane or some equally slow method? It took you a full hour to get here from Chicago. What was the matter?"

"Hello, Arcot—hello, fellows. Sorry I kept your royal highnesses waiting so long, but just as an aside I might mention that I think it would do you a lot of good to wait once in a while," he grinned as he stepped into the room. "You fellows here don't know what it is to work, and have a real job. They give you a couple million a year to putter around in a laboratory, just do any fool thing you can think of, and then, because every now and then you stub your nose on some gadjet they can use, they increase your pay another million or so, while hard-working, normal citizens of this decadent world labor for a few thousand a year. They call you a scientist, and if you want something, they spend the resources of two worlds helping you get it, all the officials on Earth and Venus dig around trying to find it—and apologize if they don't get it inside of twenty-four hours. I think it would do you a lot of good to wait once in a while." With an expression of the utmost dolor he went over to a seat by the table, looking curiously at the work that the others had done.

Arcot and Wade were smiling, while Morey, with an expression of even greater sorrow, was looking out of the window where hundreds of graceful, slim ships floated in the air, in apparent utter defiance of all the laws of gravity.

"Yes," he said, "and look at the millions of machines that have come from that one idea of his. The idea, mind you, that I worked out, that I brought into mathematical form, into a form that made it calculable. Five years—and the census of those things is already 24,000,000 on Earth, and 19,000,000 on Venus. And that doesn't include passenger liners, freighters, or interplanetary ships, which operate on a slightly different idea, but there again I worked out the mathematics. Yet he is called 'Earth's most brilliant physicist,' and I, who did all the hard work, am 'his mathematical assistant.'" He shook his head solemnly. It was a hard world.

"If," said Wade, looking at the ceiling, "you would make your quotations more accurate, they would be more trustworthy. The news said that Arcot was the '*system's* most brilliant physicist,' and that you were his 'brilliant mathematical assistant, who showed the greatest genius in developing the mathematics of Arcot's new theory.'" Wade turned his attention to a pipe he had been filling.

As a matter of fact he might have criticized some of Fuller's statistics, also, for he had been a bit wrong in saying Arcot received millions each year. Arcot got whatever sum he needed. He had only to ask for it. His discoveries had been of such immense value that no salary could have adequately recompensed him. But he seldom asked for more than seven or eight thousands a year, while Fuller drew a regular salary which amounted to over three times the highest of these amounts.

FIVE years ago Arcot had discovered the secret of controlling the energies of heat. For several centuries it had been known that heat was nothing but a motion of the molecules of the gas, liquid or solid under discussion, the greater the temperature, the greater the motion. Heat was a measure of the kinetic energy of the molecules. In every heated substance, the molecules were flying about, each possessed of considerable energy, and but for their haphazard direction, they would have caused rapid motion of the mass they made up. Every molecule was moving, bouncing off another molecule in perfect random motion, and the motion of one was exactly countered by the motion of another somewhere else in the mass, and so there was no motion of the mass as a whole.

For many years the laboratories of the whole world had been trying to discover the secret of releasing the energy of matter. There were vast stores of energy in material substance, and they had been attempting to make this energy available. Arcot had pointed out that there was already a place within easy reach where this process was being carried out on a scale that we could never hope, nor wish, to equal. The sun was releasing the energy of more than three million tons of matter every second, between 1,800,000,000,000,000,000,000,000,000,000, and 2,400,000,000,000,000,000,000,000,000,000,000 ergs each second. Earth was receiving a relatively minute portion of this vast energy, as heat. We would have far more than enough energy if we could only tap this vast store, caught and stored by the Earth as the heat of water, of the air, of the soil. It was being stored as the molecular motion of the air, water and rocks as kinetic energy of individual molecules.

Arcot had realized this dream of tapping the earth's molecular energy; he had discovered a peculiar oscillatory, electro-static field which influenced the molecules, so that their motions ceased to be random, but became concentrated to one direction. He turned the molecular motion, due to the heat of the air, into actual mechanical motion.

Imagine a bar of metal, its molecules flying about at miles a second in random motion, suddenly so influenced. At once the molecules are all moving in the same direction, so the whole bar is moving at terrific speed. If the bar should be attached to a heavy car, it would start the car moving a bit, but the energy is soon exhausted, and the car is moving slowly, but the molecules of the bar are no longer moving—and motionless molecules have a very definite physical significance—they mean a temperature of absolute zero, nearly three hundred degrees below the temperature of the air. At once the bar absorbs heat from the air, and the molecules have a new "polarized" motion, as we may call it, which is again expended in moving the car—and more heat is absorbed. The process repeats itself with inconceivable rapidity, and inside of an immeasurably short time the machine is moving, and gaining speed with a constant acceleration, which has no limit save the speed of light, for the bar, to be warm, must have a random velocity of several miles a second. Ordered velocity in a line is not heat, otherwise we would all be boiling with our heat of motion as the Earth swings in its orbit.

Here then was a source of power, the heat energy of the air, that was inexhaustible, and further, was absolutely free. Into the bargain, this gave a system which offered perfect traction in the air, and was as effective vertically, as horizontally in all directions. The old wings, rudders, and stabilizers went the way of fuel-burning engines and steamships. The new ship of the air was a slim, graceful torpedo-shaped machine, perfectly streamlined, with the copper-fins of the power-units projecting from its sides to gather the heat of the air. The actual power-units consisted of copper tanks filled with helium under very great pressure, equipped with large copper fins to gather the air's heat. These ships were capable of 6,000 miles an hour easily.

But Arcot had seen that his machine would operate as readily in space as in the atmosphere, provided only that enough heat could be found. The source of heat was the only deterring factor. They had built the *Solarite*, the first interplanetary ship, along the lines suggested by their research, and in it they had made the trip to Venus. There they found a friendly

race of rational beings, and commerce between the two planets had developed.

Many years might have elapsed before the feeling of distrust for a strange race wore off on both sides, had there not come an external force that drove both races back to the same wall, there to fight shoulder to shoulder against the common enemy of the system, not a cruel, heartless race of inimical beings that had come from space, but a desperate race, driven by the frigid cold of space to seek a warm home, some planet circling our younger sun. Desperately they had fought for it, and we had fought back, but it was again Arcot who gave us the final weapon that saved us. The one thing we lacked was energy. We had no means of getting power enough in space to maneuver and defeat the swift, slim ships of the people of the Black Star.

A few of their ships we brought down, when they incautiously entered our atmosphere where our fleet was more than a match for them, for the same force that drove our machines was the weapon that had defeated the titanic ships of Negra. Arcot had used the force field that produced the directed motion of the molecules as a weapon, he had projected it, and thus was able to control the motion of molecules at a distance. A ship does not work well when half of its molecules suddenly organize their motion and go left, while the rest remain where they are. In that case the ship parts company with itself so to speak, and wreckage is not an effective weapon. The Negrian ships were quickly destroyed, when we could come within striking distance of them, but the trouble we encountered in doing this was due to our lack of power.

The wrecked ships of the Negrians themselves at last furnished us with the solution. They had windows constructed of a curious, artificial element, a material which did not exist in nature. It was made not of electricity, as are the natural elements, but of *light*. Light had long been known to consist of corpuscles of energy, photons, and each photon, as energy, necessarily had mass. The masses of these photons attracted each other gravitationally, and when brought sufficiently close together, they actually bound each other. This solid matter resulting from bound light-energy had many unique properties. It was perfectly transparent for one thing, and it was a perfect insulator. The transparency was what had primarily interested the Negrians, when they used it for windows, but it was, in addition, stronger, tougher, harder and more durable than any material that exists in the natural universe. Being made of light, it was not fusible, nor volatile. Men of Earth had soon learned the secret of its construction, and—which was more important to them—of its destruction. It was exceedingly dense, its specific gravity was over 100, nearly five times as heavy as any substance previously known to man. The energy stored thus in the form of bound light, they had released, and used for heating the molecular motion power-units. At once the Terrestrian ships were as flexible and as fast as the Negrian ships.

THE battle that followed had decided the fate of two systems, and there in the cold, vacuous depths, of space, far from the warmth of the life-giving sun, hundreds of Earth's and Venus' bravest men had died swiftly and painlessly as the strange ray of death of the Negrians touched them, negatively catalyzing the chemical reactions of their bodies, causing instantaneous death.

We had lost much in that great struggle out there in space, far out beyond where Saturn circles, but much more had been gained. When the Black Star had passed it left behind two planets, and with it went Neptune, and Earth had actually moved closer to Venus, as their races had moved in spirit. Deserted planets the Star had left, but they still held the vast relics of an orderly retreating civilization.

From these relics, and from our own discoveries, we had much increased our knowledge by that war.

But more important, Venus and Earth were now no longer neighboring planets, but members of the solar system. It was a closer, more trusting friendship.

All men of the system had honored Arcot and his four friends as the true saviors of Mankind in that struggle, for it was their weapons that had made possible the defense. Hence, as Fuller had said, Arcot could, by merely asking for it, get anything the system had in its resources, from the lead-filled hills of Mars, to the icy plains of far Uranus, or the lux-roofed worlds that Sol had captured as the Black Star swung close in its age-long flight through space. However, he had neglected to mention that the name Fuller carried nearly as much weight as did Arcot's own.

"WELL, forgetting his deplorable memory, Wade, let's find out why it was Arcot called a hard-working man away from his drafting table to come to this play room of yours. What have you got up your sleeve this time?" asked Fuller. His interest in the papers showed plainly, as he slowly reached toward them and moved them about. He could make nothing of them, however.

"Oh," said Arcot, leaning back comfortably in his chair, "we are sorry you are so busy—we were thinking of going out to see what Antares, Betelguese, Polaris, or Sirius looked like at close range, or, if we didn't get too bored, we might run over to the giant nebula in Andromeda, or one of the others. I'm sorry you are busy—you might have helped us by designing the ship, and earned your board and weight passage. Too bad," said Arcot sadly, but with a smile in his eyes.

"What! I thought that you have been telling me for the last five years that the reason that we can never visit the other suns in your machines is that the speed of light is too low to allow it! What has happened? Has the Lord instituted a new speed law?" asked Fuller, half serious, half joking.

"Oh, no," said Wade, waving his pipe in a grand gesture of importance. "Arcot just decided that he didn't like that law, and made a new one himself."

"Well," said Fuller with a puzzled air, "I could almost believe it, after some of the other 'impossible' things he's done, but considering that the speed of light is such a fundamental property of space, I can't see just how he managed!"

"Now you've got the idea, Fuller. The speed of light, while it does act as a speed limit, is so only because of the nature of space. It is a property of our space, not a law. It limits our speed, remember, because at that speed, due to Einstein's formula for mass increase, the mass would be infinity at that velocity."

"Then the velocity of light *is so because its velocity, 186,000 miles per second, is as much a property of space as the radius of curvature, or any of its other properties.* Now, what would happen if we changed this property?" asked Arcot, looking intently at Fuller.

"Oh," said Fuller softly, while a look of blank amazement came over his face. His racing thoughts were trying to visualize the consequences. "It would mean that the speed of light—the limiting speed of the universe, was controllable. It would mean that we would be able to go as fast, as far, and as long as we wished!" He was silent a moment, then suddenly his face clouded.

"But Arcot—how about acceleration," he asked. "We can't reach any great velocity without accelerating for so long a time, that we would take a lifetime to

make the round trip, and if we hit anything more massive than a dust grain at that speed, we would be going at so terrific a rate that we would be volatized." He looked curiously at Arcot. Then he added, "And, going faster than light, our radio meteor detectors would be useless, the beams would be going backwards when they went from behind, and would never go ahead of us so as to leave us in front!"

"I'll have to explain my methods first, I see," smiled Arcot. He had been stuffing a pipe, and soon joined Wade in his attempts, very creditable attempts too, in laying a bluish smoke screen in the room. So far, the ventilator was overcoming their combined efforts.

"Fuller, did you realize that, in all the five centuries that electric currents have been known, no one has experimented with high-current densities? They just haven't done it——"

"For the excellent reason that they couldn't," interrupted Fuller.

"Partly right; they only thought they couldn't. Ever since about 1900 they have been able. Their objection was that current caused heating effects in a conductor, proportional to the square of the current, multiplied by the resistance, or I^2R in formula. Now, the less the diameter of the conductor, the greater the resistance, so, as they made the diameter small, and the current great, the obvious necessities for high-current densities, the conductor promptly heated so rapidly that it exploded.

"If they wanted to experiment with high-current densities, they would have to find something that had no resistance, or generate a current that wouldn't heat wires.

"THE latter was impossible, and they didn't seem to think to look for the other. Now it seems utterly impossible that they didn't do it. It seems so simple, why, I can't see how they could avoid doing it! But then, perhaps, like nitroglycerine, it was discovered long before it was reported—but it blew up its discoverers. At any rate, they had a substance which they could make a perfect conductor, and indeed, did so by 1920. The substance was lead, and the method was to put it in a bath of liquid helium. They did that, and had a current circulating in a lead coil for no less than four hours; it was a closed circuit and there was no resistance, so the current simply went on flowing! It stopped at the end of four hours, for their supply of liquid helium gave out. Even then they put a current of six hundred amperes through a lead wire no heavier than a pencil-lead. They had a current density that had never been equalled. Why, oh why, didn't they continue it? The world would be two centuries further advanced now!

"At any rate, I used what they did. I had a piece of lead wire, and put through it a current of 10,000 amperes, and of course, when the current density is of the order of 10,000,000,000 amperes per square inch, something is bound to happen. It did, and it was just what I had expected.

"You see, of course, that, if the resistance is zero, as it was in the lead, it makes no matter what I^2 is in the expression, I^2R, which is still zero if R is zero. Therefore no heat was developed, and the wire remained a perfect conductor. Just think, they had a current flowing for four hours, and at 186,000 miles per second, they did not lose any current after it had gone 186,000 miles per second for four hours, or 186,000 times 3,600 times 4, a total of—let's see—about 2,680,000,000 miles of wire by slide rule, which is almost the distance of Neptune from the sun. It may have resistance, but you could get as much current through it if it stretched from here to Uranus, as you would if it were only a foot long.

"You see what I am driving at. I could get any current density I pleased. I did. I got such a current density that things began to happen.

"You know, of course, from the popular discussions of the light matter, lux metal, that the quanta have weight. Quanta, as energy, have mass. Planck showed that the energy of quanta could be calculated by the law $E = nH$ where n is the frequency, and H the Planck constant. Also, it had already been known that if E is energy, M mass, and C the velocity of light, then the absolute amount of energy represented by that mass is MC^2, and similarly, if E is energy, and so forth, then the absolute mass of that much energy is $M = E/C^2$. That means *the mass of any amount of energy in absolutely any form whatsoever.* The problem can be reduced now, so that we can find the mass of a quantum, of any radiation, of frequency n, we can equate $E = nH$, and get $MC^2 = nH$. It is obvious that the higher the frequency, the greater the mass of the quantum, What radiation has the highest frequency? The Cosmic, or Millikan rays? It has been known for many years that they had an exceedingly heavy quantum. They measured it, and computed its mass as far back as 1925 or so. They found that *a quantum of cosmic rays is actually heavier than a hydrogen atom:* it is more massive than the hydrogen atom. Thus we see, that a quantum of cosmic rays contains more energy than a hydrogen atom.

"Of course, like X-rays, and light waves, they vary, but the hardest, or shortest Millikan waves are heavier than hydrogen.*

"This would indicate that, while the destruction of the hydrogen atom to energy, would not produce true cosmic-rays of the hardest type, still they would be very similar, and certainly much harder than any X-rays. But remember, a hydrogen atom is only a proton and an electron going around together. Any proton and electron, coalescing, would produce this same type of thing. Remember, too, that both the proton and the electron are waves, and they will mutually release each other by coalescing.

"Well, that is what happened when I caused a current of 10,000,000,000 amperes per square inch to flow through the lead wire. The electrons, driven by the terrific urge, crashed into the protons—and the reaction took place that freed their energy as cosmic rays.

"I had expected that, and I had also expected some other things. Remember, light, with its weak quanta, make the outer electrons of an atom vibrate, but X-rays, with their more energetic quanta, cause the electrons of the inner orbits to break free. What then, would the far more energetic quanta of cosmic rays do? They are so violent that they cause the atom to fly to pieces; they actually disrupt the nuclear structure, and the atom becomes radioactive, indeed, super-radioactive. The energy of the cosmic rays is absorbed in destroying the atom. When turned on a mass of matter, the matter glows red with the heat of swiftly released atomic energy; then in a moment boils away. Nothing can stand for cosmic rays—nothing made of electricity matter.

"I had expected this also, and I made my apparatus of lux metal and relux. Remember, we decided when we saw the Negrian ships, that they used the energy of matter, we could not find their secret, but we did find that they used lux metal, and relux to work with it. Lux, a light metal, conducts light, and reflects electricity, as silver, an electricity metal, reflects lights, and conducts electricity, while relux conducted electricity perfectly, and reflected light perfectly.

"When we start a fire, we want something that won't burn to contain it. If we are going to burn matter,

*The mass of the hydrogen atom is 1.662×10^{-24} grams, while a quantum of the Cosmic rays weighs 1.7×10^{-24}.

it may not be healthy to start the fire in material apparatus, that might catch fire, and set fire to the world. I made my apparatus of light-matter which, being of a different substance, would not be affected. It wasn't. I made my lead-in wires of relux, and, on a hunch, I made the cabinet in which I carried out the disintegration of the metal lead, out of relux. I believed that, as sulphur, in reflecting electricity does not discriminate between D.C. and low frequency A.C. or radio frequency A.C., there was no reason why relux, reflecting light, should not also reflect cosmic rays. At any rate it did.

"My apparatus was a huge success. We liberated energy all right, and the relux reflected it about 98 per cent efficiently, but in a closed case, as in our cavity absorbers, it was absorbed by the walls, and came out as heat. And how it came out! The heat was so terrific, at that, although we could not find any traces of disintegration, of the fuel I mean, the entire apparatus was wrecked by the heat of the absorbed cosmic rays. The next time, we used a relux mirror to reflect the cosmic rays away, and across the room, where they were absorbed by a cosmic ray absorption receiver. I used rough relux, which absorbs about fifty per cent on the first bounce, and, of course, by the time it has bounced around inside the cavity receiver for a billionth of a second, it is all heat. It was lucky for us that relux doesn't melt. We used relux support, and had the thing surrounded by a second relux cabinet to make sure that no rays got loose, and set the matter about going. I knew, from the fact that the shutting off of the current stopped the disintegration, that the process was not self-supporting, so I knew that material disintegration would not take place, but atomic disintegration is, nevertheless, exceedingly dangerous. I didn't want any extra reactions."

"But we had plenty of excitement." Arcot smiled, in memory, as he glanced at Wade and Morey.

"THE cosmic rays we released operated longer this time, for now the apparatus, as we had calculated, was able to continue in operation. The original set had operated for something of the order of a billionth of a second, I suppose. This operated for nearly a full second. Remember that that lux metal, unable to melt or volatilize, will stand no one knows how much heat—well, we came mighty near to finding out. It was almost invisible when I shut the apparatus off, and the asbestos shield slumped down molten. The heat was so great that it was radiating long X-rays and very short violets that we couldn't see, but we did feel. I had a terrific case of sunburn from the ultra-violets. The heat, as transmitted by the relux legs, melted the concrete floor into lava about their base. The temperature rose so quickly that, despite the noble efforts of the molecular motion cooling, I have some standard cooling units installed in the laboratory to keep it comfortable you know, we were driven out.

"We left in a bit of a hurry, and came back three hours later when the temperature had dropped to about 75 degrees Centigrade. All the bottles that had contained water or any liquid less volatile than mercury, were empty—just boiled away. When we got through cleaning up the laboratory, we started in on new experiments, and we used much less power, for we had succeeded in working out a more accurate control. We had known before what limits we could use, but not how the power varies between those limits.

"The one material that could stop the waves, was, of course, relux. Lux metal passed it like light, but the stuff would actually focus it, and we found it would also focus X-rays or any other rays we wished. Which is incidental.

"We were working with a relux plate, reflecting the cosmic rays from the projector back into a cavity receiver, trying to find out how much energy we got from one milligram of matter. That is, trying to determine the efficiency. Morey, in the meantime, was working with a standard cavity receiver and the disintegration of light metal. I have forgotten what he was doing—he has, too, I suspect, for as he turned on his apparatus, I gave a yell, and he jumped up, shutting off his apparatus. He could see nothing then, but when it was on, the relux plate glowed with all the colors of the rainbow. It looked for all the world as though someone had done a water color of the rainbow right after the storm—then a new storm had come and remodeled the painting. The colors all ran together in weird, shifting combinations. I looked at it for a while, then started making investigations. It was the big magnet he was using. The magnetic field made the relux absorb the cosmic rays, but instead of generating heat at once, they became seats of E.M.F.

"The result of that experiment was all the electrical power we could use. We needed that, and then some for the next step. This goes to Morey. He was fooling around with one of those adjustable Morley calculating triple integraphs, and took out one of the electric clutches, and replaced it with one of his own design. I don't yet see how it works, but it does a new stunt, and works a new kind of geometry. We use a new theory of straight lines. Euclid, you know, proved that there were 180 degrees in the angles of a triangle. He said that certain things were evident—and went ahead. Lobachefski said certain other things were evident—and proved that the sum of the angles of a triangle was anything up to 180 degrees.

"Einstein found that the geometry of Euclid was all right here on Earth, where the curvature of space is almost zero, but when he came to consider Mercury, Euclid's geometry was all wrong. Space is curved, and there, near the terrific mass of the sun, it was so badly curved, that Euclid's planes didn't exist, and his geometry was wrong.

"Morey has a new system, and he applied it with amazing results. We have discovered a means for giving any one of the twenty coefficients of space any value we want.

"To do this, we are straining space out of its normal condition, and the usual condition of such strain creeps up. We have to use energy to do it, and in thus straining space, we are storing energy in it. Of course, we have stored energy as space strain for hundreds of years, the induction coil, the condenser and gravity all represent energy stored in space as a strain. The more we follow this mathematical discussion, the more it seems that all energy in the universe is but strain in space: that is, there is no matter, merely energy strain, in space; that there is energy only because space is strained there.

"But, be that as it may, we have a new means of storing energy, and that is more to our point, the means so affects space, that it changes the speed of light, changes the limiting speed of the universe. We can go as fast as we want, for the limit, about us, is changed, by our curving space in a new way.

"The system is fairly obvious. Remember a torus-shaped induction coil encloses all its magnetic field within it, the torus, or 'doughnut' coil, has a perfectly enclosed magnetic field. We built such an enclosed storage coil, and expected to store a few watts of energy in it to see how long it would hold it. We made the mistake of connecting it to the power lines, and it cost us a hundred and fifty dollars at a quarter of a cent per kilo-watt. After that we used the big relux plate electric generating method.

"But that is in the essentials what we have to offer. We give you the job of figuring out the stresses and strains and so forth—we want a ship to visit our neighbors—anywhere within one thousand million light years."

"Yes, sir—Do you want a gross, or only a dozen?" asked Fuller sarcastically. "You sure believe in big orders! And whence cometh the cold cash for the materialization of this lovely dream?"

"That," said Morey, "is where Dad comes in. As president of the Transcontinental Lines, he is my nominal boss, as well as yours, and Arcot's, but the trouble is he is also my father. If he was just my boss, things would be all right; we could sell this secret of material energy anywhere, let alone this new storage coil, but he is my father, and when he hears that I want to go off to some other universe with you and Arcot—just try and convince him that it is a scientific necessity. Also, I have a large and healthy hunch that your father isn't going to help us any," he added, grinning at Arcot.

"I rather fear he won't," replied Arcot gloomily. He wanted to make this trip—and knew the difficulties involved. Morey senior, as president of the Transcontinental Lines, had full control of their finances, and they themselves could not back this expedition, which would cost fully three or four million, without his consent. Now the problem was to get the money!

"I think," interrupted Wade, "that we will stand a much better chance if we first show them a spectacular exhibition, and point out the advantages, and uses of this apparatus, then show them complete plans for the ship. They might consent."

"They might," replied Morey smiling. "But let's try it anyhow. I am getting tired of this city, though. I want to go out to the place up in Vermont. We can use the little lab up there for all we need, and we have everything worked out anyway. There is no use staying here until we are ready to give the exhibition. And in the meantime, we can indulge in a little ativism to the fish stage of evolution."

"Quite right. Quite right—it is only eighty-five in the city here, due to the heat taken by the machines in the air, but it will be ninety-five in the suburbs. To the mountains—let's pack up!"

THE many books and papers they had collected were hastily put into the brief cases, and they went on up to the roof of the building, and there they entered their little molecular motion ship. This was one of the light energy machines, not depending on air for heat, and as such was able to maneuver in space as well as in the air. They rose slowly, looking below them at the traffic of the great city. New York had long since abandoned the rivers as a means of trade, and was using their ancient basins now as airports, while around them loomed titanic structures of glistening colored tile. The sunlight reflected from them was exceedingly brilliant, and the contrasting colors of the buildings seemed to blend from a little height, into a great painting in colors. The darting planes, the traffic of commerce down between the buildings, and the pleasure cars above, gave a series of changing, darting shadows, the long lines of ships coming in from Chicago, the world's greatest city, and from London, from Buenos Aires, from the South, and from the cities of the North, and from Russia coming the short way across the pole, like mighty black serpents wound their way into the city.

They joined one of the northern routes, and for two hundred and fifty miles they remained with it, till the colored towers of Boston dropped behind, and they turned out on a route of their own, shooting at once toward their goal in Vermont.

The low green hills slipped rapidly beneath them, as they swept toward the little mountain lake that offered them a place for vacation. Arcot was controlling the ship, and now he lowered it gently into the natural basin of the little mountain-locked valley. Morey senior owned all the land here. He had been forced to buy it, for as soon as it was found he had settled here, a hundred rich and near-rich had tried to get the land that their names might be associated with his. He had succeeded, and the countryside had been left alone. Arcot let the ship glide smoothly into the shed, which had seen the construction of the first of these molecular motion ships.

"We're here—unload and get going. I think a swim and some sleep is in order tonight, before we start work on this ship. We can begin tomorrow," said Arcot, looking approvingly at the clear blue water of the little lake.

"All right—out of the way then, little one, and let a man get going," said Wade, pushing Arcot to one side, as he started for the house. Arcot was about six feet two, and weighed close to two hundred, but Wade was another two inches taller, and, but for his height, built on the same general plan that was used in the gorilla, as far as strength and size were concerned. Though but two inches taller, he was fifty pounds heavier than Arcot, so there was some reason for his calling Arcot little. Morey, though still taller, was not as heavily formed, and weighed but a few pounds more than Arcot, while Fuller was a bit smaller than Arcot. It had been known for several centuries, that the human race was increasing in height quite rapidly; indeed it was fairly apparent in one generation. The highest mental types of humanity had, for many generations been on the average, the tallest. Partly, by a combination of these factors, and partly by accident, these men were indeed "big men," but still only slightly above the average of their time, perhaps an inch or two. The average man was over six feet tall.

A day of fairly complete rest, save for a few wrestling matches, in which Wade consistently proved himself not only built like a gorilla, but muscled like one, too, and Arcot proved that skill was not without merit, for if he could but make the match last more than two minutes, Wade's huge muscles would find an insufficient supply of oxygen and tire quickly.

They all rose at about nine. Arcot got up first, and shortly after, the others found it highly advisable to follow his example. He had a large Tesla coil apparatus with which he succeeded in inducing sufficient voltage in the springs of the beds to make very effective sparks.

"Come on, Wade—get up—you, as chief chemist, are to synthesize a little coffee and heat-treat a few eggs for us. We have some work ahead today!" called Arcot, after shutting off the coil, assured that each of them had gotten a considerable distance from the bed.

"You win, Arcot—shut it off—I want to get my trousers!" called Morey. "We're all up."

After breakfast they went into the room they used as a calculating room. Here there were two different types of integraphs, as well as plenty of room for drawing graphs. They sat down at the table, and started their work of drawing up the general features of their projected ship.

"TO begin with, let us decide what shape we shall use," said Fuller. "As designer, I would like to point out that a sphere is strongest, a cube easiest to build, and a torpedo shape the most efficient aerodynamically. However, we intend to be in space, not in air. Into the bargain, we will need it more as a home than as a ship, the greater part of the trip, unless, as before, we succeed in visiting them in the

midst of a war. We landed on Venus just in time to get mixed up in a nice scrap, and I will admit that the aerodynamically good shape of the *Solarite* helped a lot then. Perhaps, for emergencies that is best. Also, it is a lot easier to look at. What about it, Arcot?"

"Fine—we want a hull all right, but what about some engines to run it? Let's get those, too. What all are we going to put in it? Where will the apparatus be placed? I will name first the general things; facts and figures later."

"First: We must have a powerful material energy generating plant. Now we could use the standard cavity radiator, and use cosmic rays to warm it, and drive the individual power units in that way, or we can have a main electrical power unit, and warm them all electrically. How about it? Which one?"

"Well, I think we would be safer if we did not depend on any one plant, but had each separate as much as possible. I suggest that we have individual cavity radiators," said Morey.

"I am still a bit in the dark as to how that electricity generation stunt works. What is the principle, Arcot?" asked Fuller.

"I haven't any idea. All I know is that it works, and I can calculate it. You know they worked effectively with electricity long before they knew what it was. By 1930 or so they had made fair progress with it, nearly as much as we have made. The general theory is that it is caused by a motion of electrons of the metal through which the current was flowing. But the electric current went 186,000 miles a second, while electrons could not. There was, obviously, an impulse that traveled at this speed, not a current. Imagine electrons racing along a wire of the telephones toward San Francisco, from New York. It would go maybe five hundred miles at the supposed 186,000 miles a second, then would turn around, as the alternating current was reversed—but what made it turn? The answer was that no electrons actually made the trip, only impulses.

"Now why should relux, which contains no electrons, be a conductor? I remember an old negro man who, when so perplexed, used to remark, 'De Lawd alone knows, and He won't tell.' Maybe so, but I think the reason is that the relux transmits not the electrons, but the impulses that make electrons move. Now, for some reason that, as my old friend remarked, the Lord alone knows, this relux, stimulated by the action of cosmic rays, and a magnetic field, produced a powerful E.M.F. at right angles to the lines of force. In my opinion, this current is, in reality, only the impulse that makes a current. But to get back to our question, which is more desirable? Many small units, or one large?" This from Arcot.

"And another question: describe these cavity receivers you want to use," said Fuller.

"They will be almost exactly like the ones we have in use with the light metal disintegrators now," replied Arcot. "They will be made of two cylinders of relux, one inside the other, like a thermos bottle. The inner one will be of rough relux, which will absorb very efficiently; the outer will be of polished relux, which will certainly stop any stray rays, as well as act as the outer wall of our thermos bottle. The neck of the inner bottle will be filled by a cosmic-ray projector, with appropriate apparatus, which will be fairly simple, and a relux reflector which will direct all the rays inside. The space between the inner and outer bottles will be filled with helium under about two tons per square inch pressure, and this will be directly affected by the molecular motion field. These will be our main power units for use around planets and so forth. I forgot to mention, Fuller, that due to the effect that the space-control apparatus has in changing space, the near presence of an intense gravitational field interacts with it, and drains its energy. In return, the field of the ship would interact with the field of any matter near it—within a hundred feet of the walls of the ship—and blast its relations, releasing its energy, probably. It would be exceedingly dangerous, to say the least. We can not use it near a planet, so we will need the molecular motion units to get us out into space. As a matter of fact, the gravitational field of the sun is so intense that we will have to go over a billion miles out, before using the full power of the space control. The power units controlled from one electric power source, would be simpler, and as reliable, I think. Anyway the molecular motion power is controlled, of necessity, from a single generator, so, if one is apt to go bad, the other is, too."

"Very good reasoning, Arcot," smiled Morey, "but still I am strong for decentralization. I suggest a compromise. We can have the main power unit, and the main verticals, which will be the largest, controlled by the individual cosmic-ray heaters, and the rest run by the electric power units. Just heating coils, I suppose, surrounded by the field?"

"That was my idea, and I think your suggestion of the compromise is good," said Arcot. "Let's make it that. While we are at it, I suggest, that, since we are going to want some weapons on the ship, we use a separate control panel, and separate generating panel for the power tubes we will want in the molecular beam projectors."

These molecular beam projectors were nothing but projectors of the field that caused the molecular motion to take place as wanted, and they were terrifically deadly. If half a mountain is thrown into the air by the sudden motion of its molecules in that direction, it is a rather difficult projectile to fight. A ship might be suddenly touched by this beam, and its bow driven back on its stern, with all the speed of its millions of molecules; the general effect being similar to that produced by a head-on collision of two ships going about ten miles a second. Funerals can be contrived, but——

Since a thing treated by this ray is broken by its own molecules, it is twisted by its own strength, and crushed by its own toughness. Nothing can resist it.

THIS ray, produced by the same means as the power units, the field being the same, required identical generating equipment, up to a certain point, and Arcot realized that they might take advantage of this.

"My idea," he said, "was that we might thus have two power-tube banks to generate the field. If one is broken down, we can switch in the other. We can even use both at once in case of real need; the molecular motion machines will stand it, if we make them of relux, and anchor them with lux metal beams. The projectors would be able to handle the power, using Dad's new system.

"And we have more projection. That will give us full power; since we will have several projectors, the power needed in operating the ship will be about equal to the power taken by the projectors.

"We might have some cosmic-ray projectors on board also."

"Why?" asked Wade. "They would be less effective than an equal number of molecular rays. Molecular rays are instantaneously irresistible, while cosmic rays take time to heat up a place. I will admit they are rather unhealthy to deal with, but, just the same, the molecular beam is quite as dangerous, I think, even more so. Why not take more of them?"

"True enough—they are quite as deadly as the cosmic rays, but they are nowhere near as spectacular.

and we may find that mere spectacular display will accomplish quite as much as actual destruction, and, incidentally, the cosmic rays have the advantage of being more local in their action. If we want to kill the enemy, and not the captive, we want a beam which will be deadly where it hits, and not fifty yards around. We will have plenty of protection anyway; we can afford to carry a little of each."

It was decided to take the cosmic-ray projectors also, and they went on to the engine room.

"Since our main power plant is to be the space control apparatus," continued Arcot, "we will have to make it the most important consideration. We will have to remember that the actual apparatus we will need will throw a field about itself after the fashion of a bar magnet, that projects more before and behind than at the two sides, so I think this at once suggests that we settle the shape of the hull in favor of the torpedo shape. But we have to remember that this coil is really an apparatus for storing energy in space, and therefore we are obliged to supply it with energy to store. I suggest that we consider that. I figured out last night just about how much power we will need. Any ship we build will have a negligible gravitational field, so I left that out, but just forming the field of space as we want it will require no less than the energy of two and a half tons of matter. Now, whatever kind of apparatus we use for the conversion of matter into energy, it will mean that a whale of a lot of wire will have to go into our cosmic-ray apparatus. The coils are charged electrically, so we can have plenty of electricity, eventually, for this task, but the sheer time considerations mean a lot. It would take at least several hours to do this. If we should be taking 'French leave' of a planet, we want to move off in considerably less than several hours. I suggest that we solve the problem by having a charging apparatus which would handle the coil in a certain length of time, and another emergency apparatus, which will charge it in an equal time, so, if pressed, we can charge it in half that time. But the regular method of charging will be by means of a series, or battery, of small coils, the torodial shape, coils that keep the distorted space all within themselves, and are not themselves influenced by the distortion, while they have stored within them all the terrific energy of their charge. We can build a battery of these that we can empty into the big coil, and so charge it very quickly, and then, when we are through using the space control, can change back quickly. Any losses we can make up, of course, from the main power plant.

"The controls we can figure out later. That will be the main power plant. How about it? Any suggestions? Of course, the engine room will also contain the big power tube banks for generating the molecular field, and we will want the air apparatus there. We can, as before, store the oxygen in tanks as a liquid; in the lux metal tanks we can safely use a pressure of five tons per square inch. The CO_2 and the excess moisture can be taken out of the air readily, and, at the same time, we can eke out the oxygen supply by using the CO_2 electrolysis process, and save the carbon so recovered if necessary—we might want it to synthesize things with.

"This process is standard on the space ships, though, so we will just buy the apparatus all asembled and put in our own power leads.

"We will want a laboratory, such as we had on the *Solarite*, for analysis of gases, and for general work. We can equip it with plenty of power, and with a few machines. We should be able to do anything there, that we can on Earth. And first and foremost amongst the provisions will go a large supply of all kinds of spare parts, spare tubes, spare coils, spare relux plates —everything we can possibly think of. Remember, we may want to build some things out in space.

"I wonder—we might find the invisibility apparatus useful on the ship. We might as well install it—we can run it on the same tubes that we use for the molecular power, and it won't cost much, and may prove very valuable," said Arcot thoughtfully.

It so happened, that Arcot was right. The apparatus he wanted to take consisted of a high frequency oscillator tube of extreme power, which caused oscillations to be set up in the ship, and the molecules as a result began vibrating. The frequency approached that of light, and as a result, light was able to pass through the material. It had been discovered originally, as far back as 1920, when the plates of radio tubes were made perfectly transparent. A body which is perfectly transparent is next to impossible to detect when it is in the air, and so the apparatus acted as a very effective invisibility apparatus. The one difficulty with the machine was that it depended on high frequency oscillations, oscillations of a frequency that permitted easy location by means of radio. Though the ship was invisible, a radio set made it highly audible. However, were this secret unknown, it was a very effective method of disappearing. And since the frequency ran so high, a special set was required.

"It sounds to me as if you had the whole thing planned out already, Arcot," said Fuller, smiling at his friend.

"I have. I don't start on one of these little jaunts if I don't think about it first; you know that. I am even going to offer you a new building material. Remember that they have discovered the secret of lux metal, and relux. I suggest that the hull of the ship be made of foot-thick lux, and lined inside with relux wherever we want it to be opaque. Lux would be transparent—annoyingly so. Also, if we came near a hot star, the energy we would absorb would be dangerous and we would be badly burned. We want the windows equipped with relux shutters; even the pilot room." This proved to be another wise precaution.

"Whew—a foot of relux—and we will need a big ship—good Lord, Arcot, that thing will weigh a quarter of a million tons with all that lux metal! With metal as dense as all that—but then—we can afford it, I suppose. It would make pretty fair protection. We could hit a planetoid with that ship, and just smash right through it! And a relux inner wall! I think we ought to make it a separate wall. Say a one-inch wall of relux, that would be sufficiently strong—and then we can have a vacuum between the walls. If we get into the atmosphere of a warm planet, we will be much better off. Also, cracks in the outer wall will not leave us airless in space.

"But what a ship! Think how beautiful it will be with that shining relux wall! The lux will be invisible! It is so transparent that it will be impossible to see it.

"And how about size? You say it is to be torpedo shaped. That means a better-looking ship; we can make a nice, trim craft! It will be about thirty feet in diameter; we will need ten feet ceiling on each room, and two decks, and due to curvature, another ten feet can be used for storage, oxygen, water, and apparatus storage space—closets and so forth. The length will be about two hundred feet, I suppose. We will need a good bit of room for all the apparatus, and—well, that length gives more graceful proportions!"

"That is up to you—you tell us how much the hull and furnishings will probably weigh. Make the interior furnishings of ordinary metals, it will be cheaper, lighter, and easier," specified Arcot. "The engine room will be at the rear center of the ship. The absolute

stern of the ship will be an observatory, with one of the Negrian Telectroscopes. The main propulsion units—well, you know how to place them. The control room, of course, in front. We will want ray projectors on all sides and on the bottom. Most of them, of course, at the bow. We will be in space, or on those other planets, for some time, probably, so I think it is only wise to give ourselves plenty of room to move about in. But if you can prepare your estimate, we will get ours ready. While you are working at it, we will start getting up our little exhibition for Mr. Morey and Dad. And don't forget a cost estimate."

The work was well under way, and there was every reason to hope it would go to a successful completion. The physicists went to the laboratory, while Fuller set to work on his end of the job.

IT was two weeks later when the older men were invited in for a first showing of the apparatus—the new material energy apparatus. The demonstration was to take place in the little laboratory of the camp. The apparatus had been brought up from New York City, and set up three days ago. They were all ready to demonstrate their work.

"I am not going to explain these things before the demonstration, but after," said Arcot. "Like magic, they are most astounding before the explanation is given and, like magic, they work better in the dark."

Illustrated by WESSO

Like black magic it seemed indeed, the shadow of the man standing at the table, clothed in a long, dark cape, filled with lead, to protect him from the radiations as much as possible. It made a strange and impressive scene.

He turned to the table, on which was mounted a small projector of searchlight type, with a rather heavy cable leading to it, and several other leads running to a small molecular motion panel, a standard make of power panel. Arcot touched a small switch, and the panel sprang into life, the meters moved, and the little pilot lamp glowed. In the path of the projector there was a large lux metal crucible, with a ring of relux, and a series of points of that material pointing down into it. These points were grounded. Inside the crucible was a small ingot of coronium, the strong, hard Venerian metal. It melted at a temperature of over twenty-five hundred degrees centigrade, and boiled at nearly four thousand. The crucible was entirely enclosed in a large lux metal case, which was lined, on the side away from the projector, with roughened relux metal.

Arcot depressed a small switch. There came the heavy thud of a large relay and suddenly a solid beam of brilliant bluish light shot out from the projector, a beam so brilliant that the entire place was lit with its intense glow, and the heat seemed to diffuse through the room from it. It passed through the lux metal case, and through the coronium bar, and seemed suddenly chopped off by the roughened relux. As a matter of fact, that roughened relux was something new; Arcot had found a way to so increase its absorption powers, that it absorbed over ninety-nine percent of the rays that struck it.

The coronium bar suddenly glowed red, then white, and slumped molten into the bottom of the crucible. The relux plate was already glowing intensely blue, and soon faded from sight as the wave-length of the emitted light became too short to see.

The crucible was filled now with a mass of metal that glowed intensely white, and seethed furiously, the slowly rising vapors told of its rapid boiling, and their settling showed that their temperature was too high to permit them to remain hot without radiating. They condensed, and fell, only to boil away again. For perhaps ten seconds this went on, then suddenly a new factor was added to the performance; there was a sudden crashing arc, a blaze of blue flame that seemed to sweep in a cyclonic twisting motion about inside the crucible. The blaze of the arc, the intense light of the incandescent metal, and the weird light of the bar of radiation, seemed shifting in some fantastic play of colors. Like black magic they seemed indeed, the strange triple shadow of the man standing at the table, clothed in a long, dark cape, filled with lead particles, to protect him from the radiations as much as possible. It made a strange and impressive scene. Suddenly the relay sounded again, the bar of radiance disappeared as quickly as it had come. In an instant the relux plate was glowing violet again, then it was white, then slowly it sank to an angry red. A moment after the rays died out, the arc had stopped, and the metal was cooling rapidly. There was a heavy purplish vapor in the cabinet now, a vapor which condensed on the walls of the cabinet that enclosed it, where they were cooled by the air, into black, flakey crystals.

The elder Arcot walked over to the table, and looked at them curiously, then at the glowing metal.

"I wonder—As a physicist I should say it was impossible—but if it did happen I should imagine these would be the results. Well, go on with your exhibition, Son."

"I want to know your ideas when we are through, though, Dad," said Arcot junior. "The next on the program is a little more interesting, perhaps. At least, it demonstrates a more commercial aspect of the thing."

Morey junior had run in a small handling machine, on its caterpillar rubber treads, and with the aid of a small electro-magnet, had picked up the lux case, and its contents, and carried them off. A minute later he appeared with a large electro-magnet, and a relux plate, to which were attached a pair of huge copper bus bars. The relux plate he placed in a stand that Arcot had prepared in the meantime, directly in front of the projector. Then he placed the big magnet behind it. In a moment the magnet leads had been connected, and a coil in the form of two toruses intersecting at right angles, and fully enclosed in a relux case, so that only the shape showed, had been connected to the heavy terminals of the relux plate, an ammeter in series, with a heavy coil of coronium wire, rather a spring, for it had originally been part of a small machine's shock absorber, was in series with both. A voltmeter was connected across the terminals of the relux plate.

The connections swiftly completed, Arcot sent the current first through the magnet, then turned on the rays. Instantly there was a sharp deflection of the voltmeter.

"There's a switch built in the coil, so there is no current yet," he explained, as the ammeter remained steady. Shorted as it seemingly was by the relux plate, nevertheless the voltmeter read twenty-two. Arcot changed the current through the magnet, and the reading dropped to twenty.

The rays had been on at very low power, the air only slightly ionized, but now, as Arcot increased their intensity, the air in the path of the beams shone again with that strange blue, while the relux plate, subject now to eddy currents, since there was no other path for the energy to take, began to heat rapidly.

"I am going to close that switch into the coil now. Watch the ammeter, and the voltmeter," said Arcot.

There was a dull thud as a heavy contact inside the coil case snapped shut. Instantly the ammeter jumped to read 4500 amperes, while the voltmeter gave a slight kick, then stood firm. The heavy coronium spring grew warm, and began to glow dully, while the ammeter dropped slightly with the increased resistance.

The relux plate was cooler now, and the voltmeter was still steady.

"You'll have to take my word for it, now, but that coil is storing the energy that you see flowing into it. I'll show you later. Notice that the coronium resistor is increasing its resistance, but that otherwise there seems to be little increase in back E.M.F. The power is coming from the relux plate, by a new system. The energy comes from the rays you can see there. Notice that the space within the right angle of the coils is growing dark, despite the powerful light shed by the ionized air."

Indeed, the space within the twin coils was rapidly growing dark; it seemed to be darkening the image of the things behind it, while their outlines became blurred. In a moment the images were completely wiped out, and the region within the coils became a strangely solid blackness.

"That is enough for the present. We have, according to the readings of the voltmeter, ammeter and chronometer, stored 20 × 4500 × 1/6 of an hour, kilowatt hours. That is a kilo-voltmeter, by the way. That is fifteen thousand kilowatt hours, and, as you can see, there seems to be no limit to how much power we can get into it. That is now worth, just from the power it contains, about forty dollars, at the regular ¼ of a cent per kilowatt hour. I have not been using anywhere near the power I can get out of this apparatus. I am going to take some power now."

QUICKLY he disconnected the ammeter, the resistance coil, and the power coil. Then he connected the relux plate directly to the power coil.

"I can't demonstrate the amount of current this thing is swallowing now, since the current is more than any of our instruments will begin to handle. I am going to use an instrument I made for this purpose. Remember, that there are lines of magnetic force about any current, and that a north pole magnet, free to move, would follow them around and around the wire. I have here an old toy that they used to use in physics lectures and demonstrations of this in the twentieth century. It is just a magnet, bent into a jogged line, the north pole here, can swing around the wire here, through which the current is flowing, while the south pole, down here, carries the current out, and so does not swing around it. The mercury cup here makes contact between the magnet steel, the south pole, and the wire around which the north pole swings. The force that tends to swing the magnet is directly proportional to the current. My apparatus here consists of a somewhat similar machine, but I was forced to use this piece of spring metal to hold the little electro magnet that replaces the permanent one you saw in the toy. The south pole of the magnet, by the way, is this end of the spring; it is all iron. This removes the south pole sufficiently so it does not interfere. Watch."

He pointed to a scale that read 10, 20, 30 and so on up to 100. The conductor about which this magnet was expected to rotate was a relux bar about three inches in diameter, and relux is a very nearly perfect conductor.

Arcot snapped shut the switch. There was a sudden hum, and then they saw that the magnet was straining to circle the conductor, and that the scale was reading 95 approximately. The relux bus bar was heating slowly; then suddenly they noticed that the reading was increasing!

"Shut off the rays—quick, Arcot—the conductors are setting up a second field in the plate and causing trouble!" called Morey, Junior. Arcot snapped open the ray switch, and at once the bar of radiance died, and the indicator dropped back to zero.

"The scale, there, indicates, approximately, millions of amperes. That was as near as I could come. There are no such meters made now. Look at the space inside the coil. I am going to shine this ray of—well—this ray, on that dark spot, and watch what happens."

Arcot swung the projector till it was directed at the spot of utter blackness within the center of the coil.

"I might mention that that is a perfect vacuum there, also. Watch."

Arcot picked up a pair of pliers, and tossed them toward the coil. They flew toward the darkness, and suddenly rebounded as though they had struck a wall of rubber. He threw them with even greater force, and they bounced back again.

"This illustrates another thing; this is a sort of static condition. I don't have to keep the current flowing as in the ordinary induction coil. Also, well you can see for yourself, the amount of energy the coil holds. I will not try to tell you how much is in there now, and I will not discharge it, but you can see what a nice handy instrument it makes!

"Now, Dad, what are your theories? My little demonstration is completed, I guess."

"Well, Son, I don't know just what to say. Some of the things I saw here are 'impossible,' but then, I have seen you do 'impossible' things before.

"Those rays—they might be cosmic rays—they ionize air—they go right through that crucible filled with coronium; they seem to do something to that metal, and if cosmic rays could be generated, they would disintegrate metal, and its broken atoms would fly to pieces, and the electrons, freed, would 'boil off' into the air, leaving the mass of metal positively charged by the excess of protons. That would account for the arc we saw. Cosmic rays have a terrific energy content, and if they could be absorbed by something, and that energy converted directly into electricity, it would account for your source of power there. Further, as far as the coil goes, that is easy to understand. Any storage device stores its power by the strain in space; here you can actually see the effect of the strain on space.

"The source of cosmic rays I don't know, but I know that any radiation either absorbed, or radiated, must be about 860 times the diameter of the radiating body in wavelength. Heat and light waves are about 860 atomic diameters, which means the outer electron orbits. Of course, that is why we see light rather than any other wave. X-rays are given by the inner electron orbits. Cosmic rays are given only by the protons or electrons themselves radiating. This is possible only if they are destroyed. Which tells me, by scientific deduction, that my ex-laboratory assistant has proven better than any other man that ever lived. He has released the energy of matter. Right?"

Arcot, Senior, looked toward his son smiling, questioningly.

"Perfect detective work, Dad, I have done just exactly what you thought. The whole success of your deduction depended on the idea that I was using cosmic rays. How could you guess, or deduce, that?"

"Partly guess—partly deduction. I remembered that you must have a new ray, as none was known that would do all that. It evidently was not an X-ray, for it went through the coronium readily. I knew that X-rays were reflected by relux, and realized that you might focus the cosmic rays. Since it penetrated the coronium, I at once assumed that the waves were shorter than X-rays, and as there is no intermediate between the innermost orbits of electrons, and the electrons and protons themselves, I decided they were cosmic rays."

"The last step is doubtful—there is no known radiation between the two, true, but it is conceivable that a vibration of the nuclear electrons might be set up which did not destroy them."

"Well, Son, I have never tried out mathematics on that, but I think the atom would be unstable. Aren't gamma rays of radium shorter than X-rays? Then I think that is our answer—those rays are emitted by nuclear electrons being set in vibration; the atom then becomes unstable and blows up. How does that suit?" asked Arcot, Senior.

"Hm—a very nice theory—I think I'll look into the math of it——

"But right now," Arcot added quickly, turning to Morey, Senior, "I am interested in the mathematics of finance, the proposition is simply stated——"

Perhaps it was simply stated, but it took Arcot, Morey, Junior, and Wade fully an hour to discuss the science of it. Then Fuller spent another hour over the carefully drawn plans of their ship.

AT last Morey, Senior, settled back, and looked vacantly at the ceiling. They were seated now about the low table in the "pow-wow room," as Arcot called it. The study was always used for such conferences.

"Well, boys, as usual I am in a position where I am forced to yield," said Morey, Senior, after a few minutes' low whispering to Arcot, Senior. "I might refuse financial backing, but you could sell either the rights for the relux plate, which could be used for absorbing cosmic ray energy from space, the cosmic ray projector, and material energy destruction secret, or the energy storage device for about one billion dollars, and back the expedition independently, or you could, with your names, make a request to the public for financial backing, and have the money that way." He stopped smiling.

It was well known that either of these men could not buy anything at stores; they were promptly given anything and everything they asked for.

"I think, however," Morey, Senior, continued, "that we can trust you. Armed with cosmic rays and molecular rays, you should be able to put up a fair scrap anywhere. Also, I have never detected signs of feeble-mindedness in any of you. I think I can trust you. I'll back you all right."

The true American Indians may be a dead race now, and the red man may be practically extinct, but Arcot and his friends certainly proved that his customs were not. They executed a very creditable imitation of the War Dance, with appropriate whoops, and so signed the agreement. The ship was to be built.

"I hate to interrupt your exuberance," said Arcot, Senior, "but I should like to know the name of this remarkable ship."

"What? Name? Oh. It hasn't any," said Wade.

"That is indeed an important oversight. If a crew of men can overlook so fundamental a thing, I wonder if they are to be trusted."

"Well, what are we going to call it, then?" asked Arcot, Junior.

"*Solarite II* might do—it will still be from the solar system," suggested Morey.

"Yes—it will—but I think we should be more broad-minded—we aren't going to stay in this system; we will not be in this galaxy all the time. We might call it *Galaxian*," said Arcot, Junior.

"Did you say be broadminded? We aren't going to stay in this little dot in space—this little Island Universe!" said Wade. "Let's be broad, and call it *Universite*, or something like that. Or, why not be equally broad, and call it *Flourine!* That is everywhere in the universe, and is the most active element there is. This will go everywhere in the universe, and be the most active thing ever existed!"

"Well, that gets my vote," said the elder Morey. "I think that is a good name."

"That is mighty good. I like the idea—but it lacks ring," said Arcot, Junior, slowly. He paused, then looking up at the roof, repeated slowly:

> "'Alone, alone, all, all alone,
> Alone on a wide, wide sea,
> Nor any saint took pity on,
> My soul in agony.'"

He rose, and walked over to the window, looking out where the bright points of light, that were the stars of space, rode high in the deep violet of the moonlit sky.

"The sea of all space—the sea of vastness that lies between the far-flung nebulas—the mighty void—alone on a sea, the vastness of which no man can imagine—alone—alone, where no other man has ever been, alone, so far from all matter, from all mankind, that not even light, racing at billions of miles each day, could reach home in less than a million years!" Arcot stopped, and stood looking out of the window.

Morey broke the silence. "*The Ancient Mariner.*" He paused. "'Alone' will certainly be right. I think that name takes all the prizes."

"I certainly agree—*The Ancient Mariner*—it is kind of long—we will probably call it *Mariner*, but I think that is *the* name," said Fuller.

It was agreed on unanimously.

This important question settled, the discussion of the ways and means and where the ship was to be built started. The final discussion was ended after three in the morning. The decisions were numerous, and weighty. The terms, that interested the young men, were that they were to have the car built as they specified; it was to be built in the main shops in Newark, the power needed was not available in the little shops here. They must have tremendous amounts of power, and the new material energy would, of course, contribute tremendously to the building of the ships. Still it would be a lengthy and all too time-consuming a job. The huge walls of lux metal would require great care in construction, for they could not be welded, and must be formed in position, and could be polished only under powerful magnets, when some of the tremendous strength and hardness was lost. The effect of the magnetic lines of force in some way alters the light quantums.

A LARGE force of skilled men was kept busy on the work, and yet it was two months before the last of the hull work was done. Then came the laborious work of installing the power plant, and the tremendous power leads, the connectors, the circuits to the relays—a thousand complicated circuits. The apparatus had been ordered long before. Much of it was standard; the molecular power tubes, the molecular ray projectors, the power tubes for the invisibility apparatus, and many other parts. All the relays were standard, the gyroscopes for stabilization were standard, and the equatorial electro-magnetic braking equipment, that permitted motion about them at will, yet made it possible to check in any given position at will, was standard.

The long days of work that followed, in which these three men did the complicated wiring, they alone knew about, for none others on Earth understood the circuits they had to establish, meant hours of work, but at least it was work they could do and know was well done.

During the long weeks of waiting, which preceded this period of activity, Arcot and his friends worked on perfecting auxiliary devices to be used with the ship. They wished to make some improvements on the old molecular ray pistols, and to develop cosmic ray projectors for hand use. The necessary power they stored in small coils of the new type in the hand-grip of the pistol. Despite their small size, the coils were capable of storing power for thirty hours continuous operation of the rays. The finished pistol was scarcely larger than a standard molecular ray pistol, such as is made for use with an external supply of power.

Arcot pointed out that the explorers who had visited frigid Uranus had had great difficulty with the greater gravitation, and had they been forced to deal with inimical beings they would have been greatly handicapped. Since the present expedition hoped to go to other planets of various sizes, and various constitutions, they must be prepared. They lacked any method of getting about readily under high gravity. Also they must be prepared to meet extreme conditions of temperature and pressure. The modern "altitude" suit, for use originally at high altitudes, had been developed to a point where it was perfect for use in the vacuum of space, or under heavy pressure. Made of woven lux metal wires of extremely small size, it was exceedingly tough, yet pliable, and strengthened with cords of lux metal, it was easy to manage when in space; it did not bag out and get in the way. The regular suits carried a small tank on the back with oxygen stored therein, and a small cooling coil which removed the CO_2 by freezing it out. Heating was arranged for either by a small lux metal disintegrator, releasing the energy of the light metal into heat, or by storing the energy in batteries.

Arcot proposed a considerable improvement. He first demonstrated it to his friends one afternoon in the shop yard.

Morey and Wade had just been in to see Fuller about

a slight change in the construction of the main molecular power unit supporting brace. As they came out, Arcot called them over to his work bench.

He had on an altitude suit made of the lux metal wire, air-proofed by the judicious use of rubber, and with an unusual number of lux metal cords, but in this case the cords had been made into broad woven belts, extremely pliable, but extremely strong. Made of lux metal, a non-electric element, it was able to resist the attack of absolutely any chemical agent; nothing could corrode it; it offered protection nothing else could offer. Its extreme strength, however, made it stronger, pound for pound, than steel or even coronium.

On his back was a pack of relux plated metal, it seemed. It fitted the back closely, and its rounded outlines made it seem quite comfortable. To it all the broad lux metal straps were connected, while from it ran a number of cables to a broad belt about the waist, and one thin cable ran down the right arm to a small relux tube about eight inches long by perhaps two in diameter. There were two holsters attached to the belt, obviously for holding the two pistols, molecular and cosmic, that they intended to carry. On the chest were hooks, and bolts with wing nuts. These evidently were for the oxygen equipment that now rested with the helmet on the back. This part here was made of clear lux metal so that the helmet, while capable of withstanding a terrific blow, permitted vision in any direction.

"Watch! No explanations till later!" grinned Arcot. He reached to his belt, and flipped a little switch. There was a swift humming from the pack on his belt, an electric motor, picking up speed swiftly. He touched another control; then he seemed to jump a bit, as the suit he wore tautened about him, then, turning a small rheostat control, the slight sounds of adjustment told of some added strain on the suit.

"So long—see you later!" he called. He pointed his right arm toward the ceiling, and sailed lightly up into the air! He lowered the angle of his arm, and moved smoothly off across the huge hangar, floating off across the shining bulk of the rapidly forming *Ancient Mariner*, circled the room, rising and sinking at will, then he went toward the open door.

"Come on and watch me where there is more room," he called.

Out in the open, he darted up high into the air by making an adjustment at his waist, then, a mere speck in the air, he suddenly came dropping down. He landed lightly, and stood before them, swaying on his feet, poising a bit on his toes.

"I am going to do a little jumping. Watch this and see if I don't deserve all high jump records." He grinned at them, then tensing himself, he leaped swiftly toward the roof of the great shop, nearly a hundred feet above him. He shot swiftly up at first, and with strange slowness he came to rest just shy of it.

"Whew—nearly a hundred feet! Some jump!" said Morey in mock surprise.

"Try again!"

"Or give me that weight annihilator, and I'll beat you at your own game," called Wade. "But come on and show us the secret!"

"You fellows take all the joy out of life!" said Arcot, reproachfully, as he landed rather heavily before them, only to bounce several feet into the air.

"That is a sweet little thing to have. How much load can you carry?" asked Morey, more practically.

"I can develop up to about ten tons as far as it goes, but the human body can't stand more than about five gravities, so we can only visit planets with less than that surface gravity. However, on those planets, we will be more agile than we normally are on Earth! The principle is easy to see, of course." He deftly unhooked the main cables, and took the power unit from his back.

"The main thing is the molecular power unit here, electrically heated, for convenience, and mounted on a small, but massive gyroscope. Quite a necessary bit of apparatus. I tried leaving it out, and almost took a nose dive under doubled gravity. The only other way would leave it rigidly coupled with the body. Result: when I used the little director unit here in my hand, I leaned forward a bit as you noticed. At once the main power was not perpendicular, but at an angle, and the angle increased till I was headed for my dear Mother Earth at a most unseemly rate. I was about two hundred feet in the air, but rapidly getting less, when I did some fancy gymnastics with the aid of the hand director, and righted myself, and applied four gravities on the main projector—and stopped with some considerable bump against the Earth's surface, instead of six feet under as I had for a time expected.

"The gyroscope, mounted in strong and reliable bearings, keeps the unit vertical whatever I may do, and so I no longer have that difficulty. The object is, of course, to remove the hazard of excess weight on big planets.

"The power is all generated right in the power pack here. I have a cosmic ray power plate, which I can use for charging the pistol coils, when needed, and in the meantime, for charging the starting power coil here, and to run the power unit. The molecular power tubes are standard, as is the gyroscope drive.

"I have this secondary power-cable running down my arm to the hand director unit—merely a small size molecular motion unit. The control of degree of power is arranged by pressing the hand control lever here.

"The intensity of the main vertical power unit is regulated by the controls on the belt. I can make about 75 miles an hour with this apparatus going through the air; I have only about twenty-five pounds pull on the hand power-unit. I have made only this one so far, but I have ordered six others like it—and sold the inventor's rights to your father. The idea of an individual flyer will sell well, I think.

"I thought that you fellows might want one like this also."

"I think you guessed right!" said Morey, looking at the neat apparatus in the case. "But why all the extra room?"

"Oh, it is an unperfected invention as yet, and I am thinking of putting some apparatus in there for our own private use. I'll tell you later. In the meantime I will say that we will have two spare suits in the ship, and a lot of spare apparatus."

Each of the men tried out the new apparatus, and pronounced it highly satisfactory, and since the lux metal was an exceedingly poor conductor of heat, and the fine wire made a very comfortable garment, it was, all in all, a suitable piece of equipment.

But there was much more work to be done on the fast growing ship.

WADE had been given the job of gathering the necessary food supplies and anything in the way of supplies he might think of. Arcot was collecting the necessary spare parts and apparatus; Morey was gathering a small library, and equipping a chemistry laboratory with the aid of Wade. Fuller was to get together the necessary standard equipment for the ship—tables, seats, bunks, and all standard furniture.

The long weeks we will pass over. Suffice it to say that the *Ancient Mariner* was ready one day, a clear warm day in late August, was set for their departure, since it made no difference in this ship what time of day it was when they left Earth for their first trip, Arcot, Senior, and Morey, Senior, were with them to inspect the ship. They had come in a small,

private, molecular motion ship and settled beside the shining hull of the great winter-galactic cruiser, as Arcot called it.

"Well, we came a bit later than we expected, Son, but we still expect a good show." Arcot's father smiled as he drew himself out of the little bullet-shaped car. More seriously he continued, "But I hear you do not intend to take any trial trip. What's the idea?"

"No, Dad, we figured this was the way to make the ship, and it was all right. We are betting on that. Remember, the molecular motion will get a trial first; we will give the molecular motion power plant a trial trip when we start out toward the outside of the system, and if there is any trouble we will naturally return. But the equipment is almost all standard, so we are expecting no trouble.

"The only part that would require a trial would be the space-control apparatus, and I don't see how we could give it a trial trip here. Remember, we must try it after we leave Earth, and get well out of the sun's gravitational field. If we tried it here, the sun's gravity would so interact with the space control, as to drain out the energy, and permit us to fly away from the sun without any gravitational attraction acting upon us. It would merely overcome gravity while its energy lasted.

"On the other hand, when we do get out, and get started, we will go faster than light—and necessarily in a straight line—or as straight as the curve of empty space will permit. We will go a dozen light years in the first test, no doubt, so we will be hopelessly beyond the range of the molecular motion machines in an instant. We would never be able to return if we did not have the space control. In other words, if the space control doesn't work—we can never come back anyhow, and if it does, why come back? We are the only ones in the world who could fix it if anything went wrong, and with the mass of apparatus we are taking in case of emergencies, and the small power shop, and machine shop, the lab, and all, we could make a new ship in space if need be! I see no reason to call it a trial trip!"

"Well—I suppose all you say is right. Still, a trial trip sounds cautious."

"But we can't be cautious in this. It either works, in which case we don't need a trial trip, or it doesn't, in which case the trial trip wouldn't do us any good. We are the only ones who know how to fix it, and we will try to get back. Of course, I will not be able to signal Earth. I will send signals if anything does go wrong, so that you ought to hear from the ship in about a dozen years, at any rate." Arcot smiled as a thought struck him.

"We may go around the universe in this machine, and be back here in time to hear ourselves talking! That beats the famous story about the man who could turn the light out and get in bed and be asleep before the room got dark!

"But you see why we felt that there was little reason for a trial trip. If it is a failure—we will never get back to say so; if it isn't, we will be able to continue."

"Perfect logic, Son, but I guess we may as well give up that discussion—personally I don't like it. Let's see this ship of yours."

The great hull had been made two hundred feet long, and about thirty feet in diameter. The outer wall was made of one foot of solid lux metal, and then came a two-inch gap, which would be a perfect vacuum, but was now filled with air, as they had not had a chance to empty it into space yet. The inner wall was one inch lux metal, and the two walls were joined in many places by small lux metal cross-braces; the lux metal being a very poor conductor of heat, and the vacuum a non-conductor, they had to be protected from such heat as they might gather, while passing through a planet's atmosphere. The inner wall was coated, on the inside, with a layer of relux, thin, but still amply able to turn the rays of any star protecting them from heating from this source, and at the same time, its perfect reflecting ability made it almost a perfect non-radiator. But its principal use was actually to protect them from cosmic rays of space, for on the trip they expected to pass through the vast inter-galactic spaces, where the rays were presumed to originate.

The windows consisted of spaces cleared of the relux, the lux being, of course, perfectly transparent.

The inside of the ship had been painted with a leaf-green paint, and decorated in various ways, for this was to be as much a home as anything else, and the scenes depicted in some of the pictures were intended to aid them if they visited other planets, for they were scenes of Earth and Venus, maps of the Earth and Venus, Mars and Mercury, and of the solar system, of the entire galaxy, and different stars were labeled. These relieved the monotony of the walls, and would help in relieving the expected monotony of the trip. The leaf-green color rested the eyes; the brilliant reflections of the relux would be very tiring. However, spaces here and there had been left unpainted—these served as mirrors.

From the outside it was difficult to detect the exact outline of the ship, for the clear lux metal was nearly invisible, and the foot of it that surrounded the more visible part of the ship made a curious optical illusion. Too, the perfect reflecting ability of the relux made it difficult to see; it was more by absence than presence that one detected it. It blotted out things behind it. The great window of the pilot room disclosed the operating seats and the great switchboard to one side. Each of the windows was equipped with relux shields that could be placed in position quickly, and these were already in place over the observatory window, so nothing was to be seen here except that the long narrow portholes of the different rooms showed their lighted interiors.

For some minutes the elder men stood looking at the ship. They had been requested to wait till it was finished before examining it, so this was their first view of the machine.

"Come on in—see the interior," suggested Fuller.

They entered through the one low door that opened into the grounded bow, close to the base of the ship. The heavy lux metal door was opened by machinery by the correct application of forces, but the combination depended on the use of a molecular ray in the correct place, which made it impossible for people of another world to open it, unless they had both the ray and the knowledge of the correct place. As the pale bluish beam reached out and touched the ship, flickering for an instant, the door hummed and sank back before them, then halted three feet back. They entered, and found themselves in the air lock, which would give them access to space or to other planets at will, without opening the ship proper.

From the air lock the way lead them directly into the engine room or power room. Here they heard the soft purring of a large oscillator tube, and the indistinguishable murmur of a number of smoothly humming generators, giving the necessary alternating current, deriving their power from a large cosmic-ray relux plate which furnished thousands of horsepower. Arcot, Senior, glanced in surprise at the reading of a heavy ammeter of the new type, connected to the giant power lead.

"Half a billion amperes! Good Lord—where is all that power going?"

"Well—it happens that it is at a pressure of ten kilo volts, as far as you knew it might have been no power at all, for you didn't know the voltage. The ten thousand volts, and five hundred million amperes makes five trillion watts. That has been running for half an hour, and has another half hour to go. Also there are several other relux plates like that at work, doing about as well. We are pumping power into our storage coils, for use with the main power control. It takes two tons of matter to charge the coil to capacity, and we are carrying twenty tons of fuel, enough for ten charges. We will need not more than three tons if all goes well, but 'all' seldom does this. The twenty tons we will carry when we leave here—the matter we are using now we took direct from the shop."

"SEE the large black cylinder up there?" Arcot, Junior, asked.

Above them, lying along the roof of the power room, lay a great black cylinder nearly two feet in diameter, and extending out through the wall toward the rear. It was made integral with two giant, lux metal members that reached to the bow of the ship in a long sweeping curve. From one of the power switchboards, two heavy cables ran up to the giant cylinder.

"That is the main horizontal power unit. We can develop an acceleration of ten earth gravities either forward or backward, and more if the human body will stand it. At that rate of acceleration the ship will weigh two million five hundred thousand tons; it weighs two hundred and fifty thousand as is. That accounts for the size of those lux metal beams.

"In the curve of the ship, on top and sides and bottom, there are power units for motion in the other two dimensions. These we can't see, but they are smaller than this—for this one does the work that three of them must do. It is located in the gravitational center line of the ship. It runs nearly the length of the ship, as you see.

"But there is little we can see here that is new. Those motor-generator sets over there are not new; the tube banks there are merely standard power banks for the molecular motion; the relay board there looks but little different from the standard ones, and the power control board has only a few more instruments. Come in the next room though." Arcot paused, and opened the heavy relux door, leading the way into the next room. It was twice the size of even the large power room. The center of the floor was occupied by a heavy pedestal of lux metal. On this pedestal, near the roof, was a huge coil, relux encased. It was obviously in the exact gravitational center of the ship. There was one large switchboard at the extreme opposite end, while around the room, in ordered groups, stood the familiar double coils with their planes at right angles, but each of these was five feet in diameter; the space within them was already darkening. From floor to ceiling they were racked, and in double rows along the side, till there was scarcely room to walk in. Each of the coils was encased in relux, the whole set being cased in lux metal.

"Hmm—some battery of power coils—considering the amount of energy one of those can store! But what is the large one there?" asked Arcot, Senior.

"That is the main space control—remember that while a torus encloses its magnetic field within it, a bar magnet throws its lines of force all about it. So here, this coil affects the space about it, and while our power is stored in that battery of small coils, we can shoot it into this one, which will then affect all the space about it. The reason one of those coils there does not fly off as I expect it to, when we use this, is that the coil itself is not in the field, the coil is surrounding the field. On the other hand, this will move, for here the field will surround the coil, which is the condition necessary."

"Arcot, I have always understood that we could never attain an acceleration of over ten gravities without killing ourselves. What protection have you, or how do you expect to attain this terrific speed without accelerating for a lifetime?" asked Morey, Senior.

"Well, we would be stuck if we didn't have this new method, for the acceleration would take too long. However, in the hyperspace we are going into, a new condition exists. In this space, you never saw light standing still, did you? Now, when light is made, it is at rest, and yet it instantly attains a velocity of 186,000 miles a second. How? Light cannot go slower than that speed and exist. However, the presence of certain things in space will alter the minimum velocity. For instance, it can go more slowly through glass, for the presence of the glass alters the condition of space. Well, in this hyperspace we are creating, *matter cannot exist at a velocity lower than a certain quantity, and we determine that quantity by using this apparatus.* We are subject to an infinite acceleration—and we are subject to that acceleration in every particle. Remember, that we have no weight when we offer no resistance to gravity, but we yield and fall freely. We yield to the infinite acceleration, and are not hurt by it. Result—we move at the velocity we desire," explained Arcot.

"Well—you go into a hyperspace—and move at any speed you please. I wonder then, how are you going to see where you are going?"

"We won't. While in that hyperspace I don't expect to see anything. We will start the ship in the direction we wish to go, then go in that line when we fall into hyperspace, and since we direct our path, we can avoid stars in that way. Meteors, or objects too small to be seen, we need not worry about, for the old law correctly stated, is, two bodies cannot be in the same space at the same time. We won't be—we will be in a different space. However, the gravitational effect of a star would ruin our apparatus, and drain out the stored energy, and we would materialize perhaps in the center of a white-hot star! The moral of which is, look out for stars!"

"Then, how are you going to see your way back; you won't be able to get a radio signal either." The elder Morey was worried lest they become lost a million light years from Earth.

"Worse than you think! We couldn't receive a signal of any kind, nor could we keep track of Earth in any way. If we go faster than light, there being nothing in this space which can, there is no means of maintaining contact with Earth. We will never be able to get a radio signal after we get more than three hundred light years away, for before Marconi's time there was no radio, and hence no radio signals could have gone more than three hundred light years in any case.

"There must, then, be some means of following back that which has been working for more than three hundred light years, or indeed, more than a million light years—I mean years. The answer is easy. The sun has been working for tens of millions of millions of years. We can only go by its light. We will have to take photographs of it as we leave, and follow back by them," said Arcot.

"I suppose that is the only way. I will have to leave it to you and trust to the fact that you are better scientists and better thinkers than I am, and that you

have a very considerable desire to go on living. In the meantime, let's see the rest of this remarkable ship." Morey, Senior, turned and walked toward the farther door.

The next room was the laboratory. Here there was a complete chemical laboratory on one side of the room, and complete physics equipment on the other. They could perform many experiments here that no man had been able to perform heretofore for lack of power, for in this ship they had more power generating facilities than in all the power stations of Earth combined!

But there was little new, and little unusual here.

"This next room is the physics and chemistry storeroom. Here we have a duplicate, or even six or seven duplicates of every piece of apparatus on board, and many extra tubes, spare coils, and plenty of material with which to make more. We have equipment of every kind here, and we could just about make a new ship out of what we have here! It would have to be a bit smaller, but it would work. A great deal of our materials are stored in the curvature of the ship, and can be gotten at readily if needed. The water and food are so stored and the oxygen tanks are there also. And there is plenty of nitrogen to replace any loss if necessary. But here we have most of the apparatus we are apt to need.

"Oh, I forgot to point out in the engine room that we have the air purifier there as well as the automatic heat control. Heating is electrical, as it is easier and safer to have one large cosmic-ray power plant than many small ones for that purpose. Cosmic rays are too dangerous!

"But here is the stairway to the upper deck."

The upper deck was the main living quarters. There were several small rooms on each side of the corridor down the center, then at the extreme nose was the control room, and at the extreme stern, the observatory, equipped with a small but extremely powerful telectroscope, developed from those the Negrians had left on one of the deserted planets that old Sol captured in return for Neptune. The arc commanded by the instrument was not great, but it was easy to turn the ship about, and most of their observations would be made from the rear of the ship.

Each of the men had a room of his own, and there was a small galley, and a library and reading room, equipped with all the books Arcot and Morey and the two others could think of as being useful. The books were clamped in place, as was everything else, lest they fly about loose when the ship accelerated. The control room, at the nose, was equipped with one giant window that included nearly a hemisphere of visible space. It was "blind" only directly behind, and there would be little to fear from behind, for there could always be someone in the rear observatory. There were cosmic-ray projectors, and molecular-ray projectors, each controlled from the control room, on the nose, and more on the stern, and a pair were set in the sides controlled from the library and the galley. They were well armed.

The seats in the control room were, as in all interplanetary and space ships, made with broad, heavy leather straps across the front to support the pilot and assist when accelerations were changing. There was a small control board at the rear of the room, which took care of permanent adjustments, and then the control panel before the pilot. The ship certainly seemed ready to sail! They were provisioned for two years—two years without stops, and, with the possibility of stopping on other planets, they could probably exist indefinitely in the ship.

"Morey," said Arcot, Senior, to his old friend, "it looks as if it was time for us to leave the *Ancient Mariner* to her young pilots!"

"I guess you're right. Well—I'll just say good-by—but you all know there is a lot more I could say." Morey, Senior, looked at them, and started off.

"Good-by, Son—good-by, men—I'll be expecting you any time within two years. We can have no warning, I suppose—for you will outrace the radio. Good-by." Arcot, Senior, joined his old friend, and they went outside. The heavy lux metal door slid into place behind them, and the heavy rubber cushions sealed the entrance to the airlock. The two men stepped down and waved to the men inside the ship. Suddenly it trembled, and then it was rising gently.

THE *Ancient Mariner* is due for a more lonely trip than ever her namesake had," said Morey, Senior, as the shining ship rose high, and disappeared in the maze of afternoon traffic. Perhaps a few of those hurrying thousands looked at the strange ship of shining metal as it rose among them, and hurried out on its journey into the unplumbed depths of the mighty sea of space, in which float, in far-separated colonies, blobs of matter we call stars. Perhaps some were curious as the first intergalactic ship left Earth, but the secret had been kept well, and no one knew what it meant.

Soon the deep blue of the sky had given way to an intense violet, and this faded to the utter black of space, as the ship drew away from the planet that was its home.

"That lump of dust there is going to look mighty little when we get back," said Wade softly.

"But that little lump of dust there is going to pull us across a distance that our imaginations can't conceive, and we will be happy to see that pale globe swinging in space again, when we get back—allowing, of course, that we do get back," reminded Arcot.

The ship was straining forward now under the pull of its molecular motion power units, the acceleration throwing them forward at a rapidly increasing rate. Already they were nearly a half million miles from Earth, and rapidly increasing their velocity. The ship was still charging the coils, and they could not use their power yet. Indeed, it would require another three hours before they would be far enough from the sun to throw the ship into hyperspace. In the meantime, Morey was methodically checking every control, as Arcot called out the readings on the control panel. Everything was working to perfection. The machine was in perfect working order, their every calculation had been checked in practice so far. But the real test was soon to come.

They were beyond the orbit of Saturn when they decided that they would be safe in throwing the ship over into the hyperspace.

Morey was in the hyperspace control room, watching the instruments there. They were ready!

"Hold on—here we go—if at all," called Arcot. He reached out on the control panel before him, and touched the green switch that controlled the molecular motion machines; then the big power tubes below were off. They were drifting through space. His fingers touched a brilliant red switch—he pushed the tumbler over—there was a dull, muffled thud as a huge relay snapped shut, then suddenly a strange tingling feeling of power ran through them, space around them was suddenly black—the lights dimmed for an instant as the titanic current that flowed through the gigantic conductors set up a terrific magnetic field about it, reacting with the cosmic-ray absorption plates. Suddenly the power seemed to reach a maximum and then it was gone!

"See the large black cylinder up there?" Arcot, Junior, asked.

The ship was quiet. No one spoke. The meters which had flashed over to their limit had settled back and now read zero once more—all save those indicating the power stored in the giant coil. The stars that shone brilliantly in a myriad of colors about them were gone, then suddenly they saw space about glow; then there was a vast cloud of stars before them, but strange, violet stars. Some, however, were a pale green. Directly before them was one green star that glowed big and brilliant, then rapidly it faded and shrank to a tiny dot, a distant star! There was a strange tenseness about them. They seemed held in a strange, compelled silence.

Arcot reached forward again—"Cutting off power, Morey!"—the red tumbler snapped back. Again space seemed to be charged with a vast surplus of energy that rushed in from all about, coursing through their bodies, producing a tingling feeling. Then again space was rocking in a grey cloud about them—the stars suddenly leapt out at them in blazing glory again.

"Well, it worked once!" breathed Arcot, with a sigh of relief. "Lord, I made some false calculations, though I hope I didn't make any more! Morey—how was it? I used only one sixteenth power."

"Don't use any more, then, Arcot!" laughed Morey. "We sure traveled! The things worked perfectly, and it certainly is lucky that we had the relays all magnetically shielded—the magnetic field down here was so strong that my pocket kit tried to start running circles around it! Those conductors carried over fifty billion amperes according to your magnetic drag meter here. The small coils were working perfectly, and you used only one sixteenth of them, as you say. They are charged again; the power went back to them all right, and we lost only five percent of the power—only about twenty thousand mega-watts."

"Arcot—I thought you said we wouldn't be able to see the stars?" said Wade questioningly.

"I did say that—and all my apologies for it. We can—but we aren't seeing them by light. The stars all have projections—shadows—in this space, because of their intense gravitational field, and the forces which exist on them cause shifts in this gravitational field, which cause changes in this space. These are of a frequency of perhaps one every minute or so, so when we come toward them at about twenty thousand times the speed of light, we get the effect of light of a violet type. Those were the stars in front of us, that we saw as violet points. The green ones were behind us, and that green light was tremendously reduced in frequency. It certainly can't be any less than X-rays, and may even be cosmics. Did you notice that there were no stars off to the side? We could not see them, for they were not so affected. I am beginning to wonder if we were not seeing electronic motions, oscillations, in the case of those behind us."

"How do you know which is which?" asked Fuller skeptically.

"Did you see the green star directly ahead of us, which dwindled rapidly?"

"Yes, I did."

"Well," replied Arcot, "that was the sun. It was the only near star, the only one we would have been able to see as having a diameter. Since it was green, and I knew it was behind us, I decided that the others were also behind us. It isn't a proof, but it is a good indication."

"You win, as usual, Arcot," admitted Fuller.

"Well, where are we? I think that is more important!" said Wade.

"I haven't the least idea; let's see if we can find out. I have the radio altimeter meteor detector on—we can leave the ship to itself, and let's all take a look at old Sol from a distance that no man ever reached before!"

THEY started for the telectroscope room. Morey joined them, and as Arcot put the view of old Sol and his family on the telectroscope screen, and increased the magnification to its maximum, they looked eagerly at the system. The sun glowed brilliantly, and the whirling planets showed plainly.

"Now if we wanted to take the trouble, we could calculate when the planets were in that position, and so determine the distance we have come. However, I notice that Neptune is still in place, and the planets of that other world have not come in yet, so the time is before the passing of the Black Star. That means little—I judged that from the looks of the system, as that was only about a year and a half ago—that means we are at least two light years away. But look——" Arcot looked himself for some time—pointing at the tiny dot that represented Earth, and the other that was Venus. "Look at those two planets. Earth and Venus—they are now very close together—see—almost exactly in line with the sun. That happens once every hundred years or so—and the last time that happened—we went to Venus for the first time! Since we happened to start in the general direction of Sirius, I think we must be within two light years of that star, so we might start our observations there. Let's turn the ship so the telectroscope can take in that field."

Arcot walked, or tried to walk, forward, but as all power had been cut off, save the meteor protection, there was no weight, and their motion was a series of long dives, and since the control room and the observatory were in line, Arcot made a single dive to his destination. The walls of the rooms and the corridors had been equipped with hand grips.

The others reached for hand grips, and Arcot swung the car gently about on its axis, till the observatory was pointing toward Sirius, the brightest star in our heavens, and from this much lesser distance it shone as a brilliant point of light that blazed wonderfully. They turned the telectroscope toward it, but there was little they could see that was not visible from Earth, or from the big observatories on the Moon or Uranus.

"I think we may as well go nearer, and see what we can find on close range observation," suggested Morey. "Turn the ship back, and I will take some pictures of the sun and its surrounding star field from this distance. Our only way of getting back is going to be this series of pictures, so I think we had best make it complete. For the first light century, we can take one every ten light years, after that, one each light century, till we reach a point where we see only diminishing views of the local cluster, then we can wait till we get to the edge of the Universe. That sound all right to you, Arcot?"

"Well—you're the astronomer, I'm not," replied Arcot. "To tell you the truth, I would have to search a while to find old Sol again! I can't see just where he is. Of course, I could locate him again by means of the gyroscope settings, but I am afraid I wouldn't find him so readily visually."

"Say—you sure are a fine one to pilot an expedition in space!" cried Wade in mock horror. "I think we ought to demote him for that! Imagine! He brings us out here some eight or nine light years—then tells us he isn't sure just where we are! Doesn't even know which of the thirty million or so stars we can see is the sun! Well, I am glad we have a cautious man like Morey along." Wade shook his head sadly. It certainly portended ill for this expedition, it seemed.

They took a series of six plates of the sun and its family from this distance, using different magnification.

"These plates will prove our story too. We might have gone only a little way into space, up from the plane of the solar system, and taken plates through a wide angle camera, but we must have gone at least nine years into the past to get a picture like this. This will be practically our only proof of our story—unless we bring back something very definitely of another planet," said Morey as he looked at the finished plates. The new self-developing short exposure plates, while not orthochromatic, were more desirable for this work, as they took less time on exposure.

The ship suddenly rotated about, and they were pointed for the blazing star that was Sirius.

MOREY and the others joined Arcot in the control room now and strapped themselves into the cushioned seats. It was decided that the machine was in perfect order, and certainly they needed no more observations than they could make from the control-room meters here.

Arcot gazed out at the spot that was their immediate goal, and slowly said to Morey, "How much bigger than old Sol is that star, Morey?"

"It all depends on how you measure size. It is 2.5 times as heavy, but four times as large as the sun. It radiates about 25 times as much light. In other words, one hundred million tons of matter disappear each second in that star. That, of course, is Sirius A; Sirius B, its tiny companion, is the most interesting star we know of. It has only one one-hundred-and-twenty-five thousandths the volume of Sirius A, yet it weighs *one-third* as much—*very* nearly the same weight as our sun! It radiates more per square inch, than our sun, but due to its tiny size—stellarly speaking—it is very faint. That star, which, as I said, weighs as much as the sun, is about the size of Earth," replied Morey.

"You sure have those statistics down pat!" said Fuller, laughing. "But I must say they are interesting. What is that star made of, anyway? Lux metal?"

"Hardly! Lux metal has a density of only about 125, while this star has a density so high that one cubic inch of its matter weighs a ton!" replied Morey.

"Whew—I would hate to drop a baseball on my toe on that world!" said Wade.

"Oh, it wouldn't hurt you. If you could lift the darned thing, you ought to be tough enough to stand that! Remember that it would contain about nine cubic inches, and that the acceleration due to gravity there would make it weigh somewhere near 200 tons! Think you could handle it?" asked Arcot. "At any rate, here we go, and you can get out and try it."

Again came the shock of the start; the heavens seemed to reel about them, the bright spot of Sirius was a brilliant violet point that suddenly seemed an expanding balloon as it grew before their eyes, spreading out till it filled a large angle. Larger than a full moon it was, as they rushed toward it at terrific velocity. Then again the heavens reeled, and they were still, and the control room was filled with a dazzling splendor of brilliant blue-white light, and an intense heat beat in upon them. The giant disc before them was indeed giving off far more heat than did the sun. Every square inch of this star gave off sixteen times as much power as the same area of the sun.

"We had best be careful here, Morey, that star, at 11,000 degrees, is blue-white, and therefore gives off far more ultra-violet than the sun, and, as all radiation is more plentiful, we will get a great overdose. Feel that heat! I want to measure that—and it seems we are not going to stay here long. At our speed we will overcome the gravity of the sun and leave. We ought to calculate our distance—take some measurements that will enable us to do so. Will you?" Arcot paused, looking at the star in surprise.

"Say—Morey, this star should be a double star—where is the companion—well—look—LOOK—That's no companion star—it's a planet! It is impossible for a planet to be in equilibrium about a double star! That star is a singleton!" said Arcot.

"That *is* a planet—I can't—why, it *can't* be! We've made too many measurements on this star to make it possible!" said Morey in bewildered surprise.

"I don't give a hang whether it can or not, Morey. The fact remains that it is," pointed out Wade, looking at the dimly lighted planet. "Looks as if that shoots a whole flock of holes in that pretty bed-time story you were telling about the dense star!"

"I make a motion we look more closely first," said Fuller, quite logically.

But at first the telectroscope only served to confuse them more. It was most certainly a planet, and there seemed a strange, vague, feeling of having seen it before. Arcot mentioned this, and Wade launched into a discussion of how the left and right hemispheres of the brain get out of step at times, causing a sensation of having seen a thing before when it could not possibly have happened previously.

Arcot looked at him for a moment, gave him a withering stare, and marched directly to the library, saying nothing. A moment later he was back with a large volume entitled, "The Astronomy of The Negrian Invasion," by D. K. Harkness. Arcot opened the volume to a full-page photograph of the third planet of the Black Star as taken from a space cruiser circling the planet. Silently he pointed to it, and to the image swimming on the screen of the telectroscope.

"Good—why—it's impossible—we have come faster than light, and that planet was here before us!" said Wade in astonished surprise.

"As you so brilliantly remarked a moment ago, I don't give a hang whether it can or not, it is. How, I can't say, save that it does clear up a number of things. Remember that the Negrians said that, in their past, as recorded in the records we found, they had had a force ray, which could be used to move planets in their orbits? I wonder if it couldn't be used to move an unwanted dwarf from a giant star, breaking up an age-old double star. Also, their scientists had been looking for the secret of moving faster than light. We have done it, why not they? They did it, is my opinion, and made a good job of it. They moved their whole planets over here! They deserted that dead sun of theirs all right, and since they could go where they wished, they went to a good star. Why bother with a second-rate sun like ours? Especially as they just received one first-class beating from the people of that sun," said Arcot.

"Perfect—explains everything!" said Morey enthusiastically.

"Except that we *saw* that companion star, when we stopped back there not half an hour ago," said Fuller.

"You are correct—*not* half an hour ago—two years ago. We are, of necessity, traveling through time. Remember that in all of Einstein's equations, time and the velocity of light are tied up together. We untied one—or tied it in knots—which you prefer—and the result is that we travel through time, every time we move," pointed out Arcot. "We haven't slept, for instance, in some ten years. Or should I say it was ten years in the future that we slept last!"

"I'm hungry—or ought to be—I won't eat for ten years!" laughed Wade.

"I sure am sorry for you, then!" laughed Morey. "If you are hungry now, what are you going to be when we reach that other nebula? It will be about three or four million light years away."

"Oh—that's easy! I won't be yet—in fact, mankind won't be for another two or three million, seven hundred thousand years!" replied Wade.

"If we are traveling in time, what time are we going to get back to Earth?" asked Fuller, suddenly worried.

"We will get back to Earth at exactly the same time we left—provided we move by space control at all times. For every second we stop, we will travel normally through time, and so spend exactly as long away from Earth, as we spend on other planets and in traveling on the molecular beam. I expect to spend some time in crossing the sea of space between the Island Universes, and that won't 'count' on our time; all other time will. We can't land in our past, because Earth is no longer there, and we can't land in the future, because Earth isn't there yet.

"But let's investigate this world. You understand why we didn't see it when we stopped before? It wasn't there yet. In fact, light would show it now as being somewhere in the vicinity of the sun!" This from Wade.

They took a number of pictures, and photographed the star from many positions, as the ship swung around it in its steady flight.

THEY were so absorbed in their new discovery, that they did not notice that there were other planets here as well. It was Fuller who detected them, using a little twelve-inch relux reflector telescope, with a compound lux metal intensifier lens of two-foot diameter. There were several smaller lenses arranged as in the old style triplet and quadruplet telescopes which gave a wide angle vision, and it was this wide angle that permitted him to see the other planet.

Morey observed it eagerly for some while, and pronounced it the sixth planet of the Black Star, and tried to watch it in its orbital movement.

"This is the most abominable place to make planetary observations from! How can you observe a planet's motion, when the whole ship is moving? I am very skeptical of this result—but it seems to me that those planets aren't moving in the same plane of revolution!" said Morey, his brow wrinkled in puzzled wonder.

Arcot thought a moment, then burst out laughing. "Excellent! Why should they be? This is an artificial arrangement, remember, and they are placing them for greatest convenience. By having them all in the same plane, it makes possible superior conjunctions when they are on opposite sides of the sun. By placing them at angles, if there were but two, so as to have the planes of orbital revolution at right angles, you would never have a superior conjunction and further, they can be more nearly the same distance from the sun, so making easier the acclimation of denizens of one planet on another, and their force rays will prevent trouble. I think they are wise, if they have done that!"

The observations were continued, till all the planets had been located, and even old Neptune, where crews of working machines were very obviously at work, building up giant structures of the lux metal, and the great cities of the Negrians, were beginning to loom on the once bleak plains of the planet. Arcot noticed that it was now surrounded by a deep atmosphere, and that mighty seas of sparkling water rolled over vast areas of its huge bulk. The 34,800-mile diameter of the planet, and its mass, seventeen times that of Earth, meant that its seas were indeed wide, and since the long gone age, when it was drawn from the flaming sun, it had never been thawed, and the mighty masses of water had lain frozen on its surface. Now, at last, brought near a warm sun, a sun which poured out twenty-six times the radiation of its former parent body, it had thawed. No doubt the Negrians had hastened the process by leaving it nearer the mighty star for a time, while its mountains of ice, hundreds of degrees below zero, thawed.

But at last they had added many pictures to their collection, and they determined to go on, for, as Arcot said, "We have plenty of proof now that we really beat light, and incidentally time, in its flight, for Earth and Venus won't receive the light-transferred news of this for eight years, and if we bring photographs of it, that ought to establish our case, and then others can take up the laborious work of classifying the planets, and getting details of their orbits, and, incidentally, start commerce! Commerce—if they are willing—across quintillions of miles of space!"

"And," interrupted Wade, "they can make the trip to this system more quickly than the trip to Venus!"

They turned their ship once more, and headed out into far space. They drove out from the star toward which they had been falling, and out into space where they could once more use their space-control apparatus.

When the great, hot disc of the brightest star, which we of the solar system can see, had once more diminished to a disc smaller than our Moon appears when seen from Earth, they turned the ship till old Sol once more showed his dim point of light exactly on the cross hairs of the "aiming telescope." Arcot again threw the little red tumbler that released a flood of energy into the coils, such as they had not used before. The space about them seemed to reel, and grow dim. The stars glowed dull red ahead of them, and those that were actually ahead, were now a violet, that was so short in wave-length as to be well nigh invisible.

Arcot watched the dull red disc of Sirius contract like a pricked balloon, and saw another star ahead of him grow to a disc off to one side—the car reeled, the relays thudded dully, the instruments flickered under a suddenly rising surge of power—then they were calm again, and Arcot had snapped over the power switch. "That," said he quietly, "is not so good."

"Threw the gyroscopes, didn't it?" asked Morey, equally quietly.

"It did—and I have no idea how far. All we can do is start a search, and at this distance we had best go by Sirius, it's both brighter and nearer. That is going—if we are going—to be our greatest difficulty. I can't avoid a star when it is coming at us at that rate, and I was using our next lowest power. The speed goes up with the cube of the power as we calculated."

"What's the matter?" asked Fuller anxiously.

"We got too near the field of gravity of a young giant star—and he threw us for a loss. We drained out three-fourths of our energy from the coils, for one thing, and into the bargain we lost our bearings. The attraction turned the gyroscopes, and threw the ship out of line, so we no longer know just where the sun is. Look at that giant will you—we must be billions of miles from that blamed star, and we can still see its diameter. Well, come on Morey, we haven't turned more than a few degrees I hope—can't tell exactly."

Their position was anything but pleasant. They must pick out from the vast star field behind them, the one star that was their home, not knowing exactly where it was—but they had one tremendous help. Their last stop had been used to photograph the star field about the sun. No man had ever before "seen himself as others see him," or seen the solar system as others saw it. The photographs would help them tremendously.

They found the sun at last, far off to one side; they had to rotate the ship through nearly twenty-five degrees to find it, however.

"That being found, and photographs being taken, let's start on again. The coils are charged again, are they not?" said Morey after they had taken another group of photographs and redirected the ship.

"They are charged, and hereafter I am going to use the least possible amount of power. It certainly is not safe to use more!" replied Arcot.

They started for the control room, much relieved. Arcot dove first, and Wade directly behind him. Wade decided suddenly to go into his room, and stopped himself by gripping a handhold. Morey, following close, bumped into him, and was brought to rest in his turn, and Wade was pushed into his room. But Fuller, coming last, pushed on Morey, and Morey moved forward once more with new velocity, but Fuller came to rest in the center of the corridor.

"Hey—Morey—send me a sky hook—I'm caught!" laughed Fuller.

"Go to sleep—it will be a comfortable bed you'll

find," advised Morey, smiling up at him as he gripped his chair. Isolated as he was in the middle of the corridor, he could not push on anything and remained stranded. Wade looked out of his room just then, and remarked that Fuller certainly was weak—with no weight at all, he couldn't push himself the length of the ship.

"Well, if certain parties, whom I will not name, wouldn't block traffic every time they get a fool idea to go into their room, I wouldn't be here. Come on, though, Morey—give me a hand—I got you off of dead center!" called Fuller.

"Use your brains, if you have any, and see what you can do. Come on Wade—we're going," replied Morey.

SINCE they were to use the space control, though, they would be subject to infinite acceleration, it would be a free fall, and Fuller would remain helplessly weightless.

The air of the car suddenly seemed supercharged with energy, as space grew grey; then the stars were all before them. They were going forward at full speed.

"Well, I have traffic blocked fairly well if I feel that way, so eventually you'd have to help me. However, my brains tell me," said Fuller, floundering clumsily, as he tried, weightless, to remove one of his soft rubberoid moccasins, "that action (he straightened with it in his hand) is equal, and opposite to reaction!" and he threw the mass with all possible velocity toward Morey. The reaction of the motion slowly, but surely, brought him near a handhold, and inside of ten seconds he gripped it. In the meantime, the flying slipper caught Morey in the chest with a pronounced smack as he struggled vainly to avoid it. Handicapped by the lack of friction, his arms were not powerful enough, of course, to move his mass as quickly as his legs might have done, for his inertia, or resistance to sudden motion, was as great as ever, and he did not succeed in ducking.

"Round one! Won by Fuller!" laughed Arcot. "It appears he has brains, and knows how to use them!"

"All right, Fuller, you win that one!" agreed Morey, laughing.

They had stopped by the time Fuller reached the control room and set about at once making more observations.

The time passed monotonously after they had examined a few stars. There was little difference, each was but a scene of flaming matter, for there is but one in a hundred million that has planets. There was little interest in this work, and, as Fuller remarked, he had understood that this was a trip of exploration. They were not astronomers; they were on a vacation; why all the hard work? They could neither do as good a job, nor as satisfactory a one, as could an experienced astronomer, so they decided to limit their observations to those few necessary for their return trip to Earth.

"We have to stop now and then to make the necessary back-trail photographs. But we want to investigate for planets anyway, don't we?" said Morey.

"Very true, but must we merely hunt at random for planets?" asked Fuller. "Can't we look, for instance, for stars of the same type as our sun, hoping that they will be more apt to have planets? I should think that such a thing as being pulled to pieces would leave its marks on the star."

"Hmmm—that is an idea," replied Morey. "Of course as far as mass of matter lost in forming a planetary system is concerned, that is infinitesimal—the total mass of the planets will not affect the mass of the parent sun more than a few millenniums of radiation losses would. The mass of the planets of our system, as it was formed, for instance, did not total over two three-thousandths the mass of the sun. Jupiter alone was the main item, the other eight amounted to little. The outer planets, excepting the ninth, and outermost, were larger by far than the inner planets, still no one of them was even one one-thousandth the mass of the sun.

"But naturally there might result certain internal disturbances."

"Well, why not try it?" said Fuller. "They certainly would be as apt to have planets as any other, if our deductions are not correct, so let's pick out a star of spectral type G-O and head for it."

They were now well out toward the edge of our galactic nebula, some thirty thousand light years from home, and still heading outward. Since they had originally headed out along the narrow diameter of the more or less disc-shaped mass of stars that forms our nebula, our Island Universe, they would reach the edge soon.

Arcot pointed this out. "We will have less chance of finding a planetary star here near the edge of the universe," said he, "for remember, that stars must pass close to each other in order for planets to be formed. Here, far toward the edge of the Island, there are fewer stars, and fewer pass. Hence the chances of planets are less."

"One can detect the difference when looking toward the center of the universe, and looking toward the edge now. See—off there, there are rather few stars, the star field is far more crowded off to the rear. We are leaving the main concentration of stars, I have been noticing the diminishing number of stars for some time," said Morey, staring at the velvet night of space.

The Galaxy is shaped like a gigantic disc, a mighty whirling plate, a mass of mighty suns, whose total mass was more than three hundred thousand million times as great as the mass of our own sun, and that sun is well above average in star size, for every one star that is three or four times as large as our sun, there are a hundred thousand which are smaller, and perhaps yet other thousands that man had never been able to see, on account of their very small size.

Man is forced to judge of star size by those stars right about his own home, and the variety in dimensions is anything but great.

But here, they had come far out toward one of the flat surfaces of the titanic disc of stars, the giant of the visible Cosmos, for no other known nebula compares with it in size or mass. Behind and to their sides lay the far-stretching mass of glowing stars. Before them they saw a phenomenon that no human being of Earth had ever seen before; they saw black, velvet night of space, and only here and there was a scattered, dim-glowing star—a far-flung speck of matter that revolved in a giant orbit about the center of gravity of the Galaxy in an orbit whose radius was fifty thousand light years! Our sun, lying as it does, near the center of the mighty star field, the sky is divided by the belt of the Milky Way, the main depth of the starry Island Universe, for when we look toward the Milky Way, we are looking through the greatest radius of the disc, and we see the greatest possible number of stars, for then they stretch on for the countless quintillions of miles, through the depth of a Universe.

And even when we look off to one side, away from the Milky Way, we see the stars, for, situated as we are at the center, they are about equally numerous on each side.

IN this particular region the stars are far closer together than in the average portion of space, for the Island Universe has here a little local cluster of a few hundred thousand stars (each weighing approximately a quarter of a million times as much as Earth) grouped close together.

Our sky is perhaps more thickly crowded than would be the sky or planets in other portions of space. But we can, with the aid of our telescopes, see other local clusters, and understand the meaning of this. Here in our little corner of space, there are stars so close together that they do not average above six light years apart!

But now, far toward the edge, where Arcot and his friends were, the black of space that stretched so unendingly off on that one side mutely testified to the tremendous distances from one star to another.

"Do you know," said Wade slowly, "I have been wondering about the progress along scientific lines that a race put here would make. Let us allow that there are stars here, and that these stars have planets; then we will endow these planets with life. But here, so far from the stars they might watch, how much slower their progress would be!"

"They would certainly have to wait till some one of their scientists developed the telectroscope, wouldn't they?" said Fuller.

"I am afraid that even that would be hopeless. The distance from star to star is of the order of 100 to 1,000 light years here, against five or six near our sun. To us, of Earth, the stars are titanic furnaces, gigantic test tubes of nature, with automatic reading devices attached, hung in the sky for us to watch. We have learned more of interest about space from the stars, than all the experiments of the physicists of Earth ever secured for us! In the stars we can watch atoms pummeled under the terrific bombardment of 28,000 degrees of heat, as S Doradus, which radiates enough heat from one square inch to run a modern space-liner—28,000 horsepower per square inch, at 28,000 degrees, and yet we can turn our telescopes to other stars, and see matter compressed to unbelievable densities, densities of 60—even 100 thousand times that of water. It was in the atoms of the sun that we first counted the 'R.P.M.' (revolutions per minute) of the electrons. They had to use telescopes on the atoms of the sun to tell those things. Earth would not disclose these secrets, and we could not get the necessary conditions there—only in the mighty stellar laboratories can we find them.

"And creatures living out here would never see those things. Their own star they could work with—but the white dwarfs they would never know. Van Mannen's star would be invisible were we not so fortunately situated. It is a remarkably weak star but of a remarkably interesting type. These hypothetical people would be quite unable to find such stars."

"I have heard the name, but I don't know much about that star. What is it?" asked Fuller.

"Well, to tell the actual truth, despite my loud talk, we don't know such a tremendous lot about it," admitted Arcot. "About all we do know is that its surface temperature is about 1,000 degrees higher than that of old Sol, or 7,000 degrees, yet it emits but 1-6,000th the light of our sun. From these statistics, knowing the rate of radiation per square inch that can take place at that temperature, and the total amount of radiation, it is more arithmetic to determine the total area—and hence the radius. The radius works out to be but 1-110th that of our sun, so the star is, if anything, smaller than Earth, yet its density is so great that it is nearly as heavy as old Sol himself!

"But, to continue the story: this lack of laboratories, this lack of opportunity for watching the suns that might teach them much, would delay their knowledge of atomic structure, and their knowledge of space, although they might know much of chemistry, physics, and mathematics to a certain extent, though physics of space is the greatest modern developer of Math. Morey, here, would never have developed his new auto-integral calculus without the need, and it was the space problems that made the need. They would be apt to be near, but still behind us in science. Do you realize how utterly uninteresting, as far as adventure goes, which is what we are after, they would be? They know enough to know what science is, and so are not to be mystified by our demonstrations, they would at once realize it was new, and interesting science—ask questions—but they would not be very interesting as far as adventure goes.

"Suppose, on the other hand, we visit a race ahead of us. We won't stay there long—it is too apt to be dangerous, for think what they might do! They might decide that this ship was too threatening to them with its mobility, and they might exterminate us, and on the other hand, they might be so far advanced that we would mean nothing at all to them—just like ants, or—a better example would be a baby—a squalling, helpless, kicking baby!" Arcot laughed at the thought.

"That isn't a very complimentary picture—and with the wonderful advances we have made, there just isn't that much left to be able to say we are so little!" objected Fuller.

"Fuller—I'm surprised at you! Have I never told you my objection to these scientific stories that tell of the very far future? They are impossible—for the simple reason that we are today opening our eyes on the world of science—our race has but *three thousand* short years behind it *and three thousand million* or more to come. How can any man of today, with his fresh-opened eyes of science take in the mighty pyramid of science that will have built up in those long, long years of the future? It is too gigantic for us to grasp. We must just wait—we cannot imagine the things that the ever-expanding mind of man will discover. And—I am surprised at you for saying that there can be no advances! There can be no greater energy than that of matter—yes? I doubt that. I am even now thinking of something new—an energy so vast—so transcendently tremendous—it is too great for man—the energy of all the mighty suns of all the Island Universes—of the whole cosmos at the hand of man—the energy of a billion billion billion suns! And every sun is pouring out its energy—at the rate of quintillions of horsepower every instant!

"But it is too great for man to have—I am going to forget it, lest man be destroyed by his own might!"

ARCOT had spoken slowly—with a dreamy look in his eyes as his halting speech told of his intense thought—of a dream of such awful energies as man had never before conceived. Dreamily he looked long out toward the black of velvet space, with its few, scattered, shining stars.

"But we are here to decide which way to go," he added with a sudden briskness as he straightened his shoulders. "Every now and then I get a new idea—and I sort of dream—then is the time when I am most apt to see the solution. I think I know that solution now, but unless that need arises, I am never going to use it. It is too dangerous a toy for man."

"Arcot, I've been wondering about the advisability of looking for a planet here," said Morey. "Why look about in this universe at all? We are near the edge now, and we are due to look a much longer time than we would have to if we went to the center of the universe. Why

not leave this universe here at once? Why not go to another—seek there for the worlds we want? Also, as you say, their development would be apt to be less, and we want the people to be up with us."

"The development, per millennium, would be less," said Arcot, "but remember our old world was approximately 2,000,000,000 years old, when we came on the scene. It is now approximately 2,000,000,000 years old. In other words, our life span on Earth—and I mean the life span of mankind, is so short, that it doesn't even count—it is far within the error of observation of the age of Earth. The Earth will continue to be able to support life for another 1,000,000,000,000 years—the probable future life of the human race. And our present development, if such it may be called, is just about 1000 years of scientific life. We have, then, the chance of picking out some planet that has a race of beings within one century's development of us—or one part in 10,000,000,000, which is not a promising proposition when you consider, further, our slight chance of finding a planet at all!

"However, under our improved system, the chances are tremendously increased, so we intend to investigate suns of the same spectral type as ours, as old Sol. I should say, young Sol, and that will automatically eliminate planets of the age I mentioned, and confine us to something within a billion or two years of the age of the Earth—or will it—for our sun was about 8,000,000,000,000 years old when the system was formed—and is now still, within the observable error, that old.

"No, we will only say that we won't land on any stars that are tremendously older, or tremendously younger than our sun.

"But I like your idea—and I think it is worth trying. We can leave this universe now, let us go out at a steep angle, about 45° to the Galactic plane, let us say, so that we will be able to see both the depth, the length, and the width of the Galaxy, toward some nebula in that direction—what do you say, fellows?"

"I say," remarked Fuller, "that some of the great void without seems to have leaked into my own poor self, and that, it being some thirty thousand years before I will have my last meal this morning—whatever it is I mean—I want another." Fuller looked to Wade, the official cook of the expedition.

"Oh! So that is what I have been wanting!" said Arcot. Then he suddenly burst out laughing. It had been ten chronometer hours since they ate, but since they had been outracing light, they were thirty thousand years in Earth's past. The strange, weightless sensation of space-traveling makes it very hard to recognize normally familiar sensations, and the sensation of hunger is one of them. Since so little work can be done, there is no great need for food, but then, ordinary hunger is not caused by lack of nourishment, but because the stomach is empty. Arcot, like most regular space navigators, had a considerable supply of some of the tasty, artificial foods which contained little or no nourishment.

Sleep was another problem. A restless body will not permit a tired brain to sleep, and though much hard mental work is done in space, the lack of physical fatigue makes sleep difficult. The usual "day" in space was nearer forty hours, with thirty-hour waking periods, and ten-hour periods for sleep.

"I think we might well start our trip with some sleep," said Arcot. "As soon as we get into free space, away from the crowded region of the stars, we can 'throw her into high,' as they used to say in the days of gasoline automobiles, and make real 'time'—indeed—we will, for the first time in history—well we are out of history already—that is about 27,000 light years behind us—the first time in pre-history, then, 'time' will really be made at the rate of—but we don't know yet!

"At any rate, let's eat, then; after the meal, we can let her ride into free space, until we get a suitable distance out, when we can stop for photographs. We will want to know what part of the nebula to enter when we come back!"

Two hours later they had seen the last of the stars swing about and fall in behind them, and now they saw the mighty disc of the Galaxy for the first time, as a free observer!

Arcot reached his hand over, and touched the red control—"I'm going to throw on half power, and stop in ten seconds." The air around them seemed suddenly snapping with an unprecedented tension—then it was gone as the coil became fully charged.

"Lucky we shielded those relays," muttered Arcot, as the tremendous surge of current set up a magnetic field that turned knives and forks and, as Wade found to his intense disgust, stopped watches that were not magnetically shielded.

Space was utterly black about them now. There wasn't the slightest hint of light. The ten seconds that Arcot had allowed dragged slowly, then at last came the heavy thud of the huge relays, then again the current was flowing, space was suddenly normal, and they were alone in blackness.

Morey dove swiftly for the observatory. Before them, there was little to see, the dim glow of nebulas ten million, twenty million, a hundred million light years off, was scarcely visible to the naked eye, despite the utter clarity of space.

Behind them, like a shining horizon, they saw the mass of the nebula they had just left. It was contracting already; it had shown a slight tilt now, and Morey made swift calculations as to their speed, by observations on fixed stars which he could recognize. He had made similar observations just before this, and as they had known the angle before, and the present angle of separation, he could calculate the distance. They had used one half power, so with twice this, they could get eight times the velocity that had been developed in this run.

Arcot floated into the gravity-free room, and struck the wall with a little thump, bouncing back to the floor by a careful manipulation of arms and legs, and thrust his toes through a little toe-hold. In the ship they always wore soft mocassins, as this made the danger of damage or injury less, and it was easier to use the toe-holds.

"What do you make?"

"Hmm—let's see—since 45° is $\sqrt{2}/2$ and the cotan. of 30° is $1/\sqrt{3}$, then—hmmm (he worked a moment with slide rule and pencil)—Well—we sure were making time! Twenty-nine light years—that means that we can make the ten million light year trip to the nearest nebulas—and still have some choice. There are a good many within ten million light years—it will take us—(a moment's work with the slide rule)—about five days—a little less. That is, at full speed.

"But let us go still further out into space. We will get the best glimpse of our universe from about five radii from it—that is half a million light years or so. We will need—six hours for that. I think we will be wisest to stop at three hours, and see what we can see about getting back to old Earth. We will want some photographs."

"All right, Morey, it's up to you. I think we can go on, and I'll start the ship now. I wonder if you will want to watch the instruments? This will be first test at full power—we figured we would make 20 light years a second, as a matter of fact, we can make about 23—that is quite all right!"

Morey had taken some photographs of the universe, but as yet they were not far enough outside, for this little trip had been more in the nature of a high speed test and had proved to be a successful test.

Arcot settled himself at the control board once more, and stopped a moment. "All ready, Morey? I just happened to think—it might be a good idea to pick out our nebula now, and start toward it."

"Let's wait—we can't make a very careful choice at this distance, anyway, and we are beyond the enlarging power-range of the telectroscope here. In another half million light years we will have a very much better view, remember. The distance of five hundred thousand light years will not mean much out of our way in any case, as we must go in that direction."

"You win—here goes!" said Arcot.

ARCOT pushed over the little red control—half way, and the air seemed snapping with the strain—a moment, and the air actually broke down in spots with the terrific electrical intensity of the charge. At thirty thousand volts per centimeter, air breaks down and sparks may pass. There were little snapping sparks in the air now, and though harmless electrically, their heat produced burns, as Wade found to his sorrow.

"Ow—say—why didn't you tell us to bring lightning rods?" he asked indignantly, as a small spark snapped its way over his hand, giving a slight burn.

"Oh—sorry—I forgot that, but you see, most of us know enough to keep out of the way of those things," grinned Arcot. "Seriously, though, I didn't think the electro-static curvature would be so slow in readjusting. You see what happens is, that when we build up our light-rate distortion field, other curvatures are affected, and we get some gravity, some magnetism, and some electrostatic fields. You see what happens when they don't leak their energy back into the coil, and so into the desired field. You can't feel the gravitational field, as you are already in it. But we are busy with the instruments—leave the motorman alone!"

Morey was calling loudly for tests. The ship seemed behaving perfectly, and the check tests were to make sure that the relays were not being burned, so that they would not respond properly. Rerouting the current in the meantime, Arcot tested them one by one. All were perfect. At last they were through.

"Say—now you two are finished, suppose you see if you can give an explanation of that!" said Fuller, in suppressed excitement.

Far off to their left, and far to their right they saw two shining ships paralleling their course! They were shining, sleek ships, their long, longitudinal windows glowing with white light. They seemed moving at exactly the same speed, holding grimly to the course of the *Ancient Mariner*. Like some guard, they followed, holding perfectly to the course, despite the terrific speed they were making!

Arcot stared in amazement, his face suddenly clouded in wonder, while Morey stared in equal wonder. Wade and Fuller, the official ray operators, slid into the ray control seats. Their long practice with the rays had made them dead shots, and they had been chosen before starting as the ray men.

"Lord," muttered Morey as he looked at the ships, "where can they have come from?"

Suddenly Arcot burst out laughing! "Don't—ho—hoh-ho—oh—don't shoot!" he cried, laughing so hard it was impossible to understand him without paying the closest attention. Wade and Fuller and Morey looked at him in amazement, wonderingly. "Oh—space—curved!" he managed to gasp.

A moment Morey looked puzzled—then he was laughing as hard as Arcot. Helplessly, Wade and Fuller looked at them, and then at each other—then Wade suddenly caught the meaning of Arcot's remark. He was also *incommunicado* a moment later.

"Well, when you half-witted physicists recover, please let me in on the joke," said Fuller, still mystified, looking curiously at the strange ships following close beside them. He realized that they were laughing at something about the ships, and when he noticed the exact duplications of the lines of his own ship in them, he realized that they were mirror images, and with a startled look, asked Arcot for the explanation.

Wiping his eyes, Arcot explained. "It wasn't really as funny as all that—they are mirror images, and in this case, shooting at the mirror, will kill the original. You realize that we are now twisted far out of shape. Due to our curvature of space, what was a straight line, or a very close approach to it, is now so badly twisted into a curve, it does not even resemble a straight line. But everything is equally twisted. A carpenter's square, for instance, might be visibly twisted, but a similarly twisted 'square' would not show it. We are twisted so much ourselves, we can't detect it.

"But light, now, is forced to go in a curve. You know they have been able to take photographs of the Galaxy before this, from outside of it, from far space. They have seen the Galaxy as it is seen from far off—very far off. They have taken pictures of it by light that left hundreds of millions of years ago, went all the way around the cosmos, and is just getting back again! What we see is an extremely smaller example of that—we are seeing ourselves—and by light that left a fraction of a second—whoa—I forgot the increased speed of light here—very shortly before—it has gone all the way around our little cosmos, and is back again. Further, if you use a cosmic or molecular ray, you may destroy the ship! It will go around, and hit us from behind!"

"Say—that is a nice proposition—then we will be accompanied by those ghosts all the way? This will be a real *Ancient Mariner* trip! There goes the spirit 'nine fathoms deep' which moves the ship—the ghosts that work the sails!" laughed Fuller.

"But there is something else I was waiting to ask you. Back there Morey said that we would not be able to get enough magnification with the telectroscope to see the universe we were heading for, yet another half million light years, out of ten, would make a tremendous difference. Why should it?"

"That is because of the theory of amplification in electronic tubes. The amplification of those stellar images is, of course, due to the vacuum tube amplifier. Do you remember back in the 1930's they had a telephone cable under the Atlantic? That was the first, and they had a great deal of trouble with it, for they had so much attenuation of signals over that distance, they could not get enough amplification. It would seem at first sight that they need only add more tubes for amplifiers. There is a limit, though. The whole principle of the vacuum tube depends on electronic emission, and if you get *too much* amplification, you can hear *one electron, single electrons striking the plate of the first tube, become audible in the last, because of the terrific amplification.* This held them up for some time, till the invention of permalloy allowed them to overcome the capacitance of the water around the cables.

"The same is true of this apparatus—there is a limit to amplification. We can operate only at a fixed maximum. There is that limit, and we can get no higher amplification. To get an image of the universe we are heading for, we must use so much amplification that this effect spoils the image now, whereas in the short 500,000 light years, this limit will have been passed, and we can use the full power that is permissible, and get a very fine image."

THEY found little to do now as they passed on at high speed through the vast realm of space. The chronometer pointed out the hours with exasperating slowness. The three hours that were to elapse before the first stop seemed as many days. They had thought of this trip as a wonderful adventure in itself, but the soundless, continued monotony was depressing. They wandered around, and Wade tried to sleep, and after lying strapped in his bunk for nearly half an hour, he finally gave up in despair.

Arcot saw that the strain of doing nothing was not going to be good for his little crew, and decided to see what was to be done about it.

He went down to the laboratory, and looked for an inspiration. He found it.

"Hello!—Morey—come here, will you—the rest of you, too!"

They came to find him staring meditatively at a power pack of one of the power belts he had designed. He had taken the lux metal case off, and was looking at the neat apparatus laid out within. This had been made by machine, already. They had been put in as a commercial article before he left Earth, the small size, and convenience was a great factor in their popularity, for they took no parking room—one merely wore them—and they were fairly fast. Of course, whereas convenient in a city, they were useless for trips of four or five hundred miles, for while it took them a full six hours, the standard private machine would make the same trip in half an hour.

"These are equipped for use with the altitude suits, of course, and that gives us protection against gases, but I wonder if we might not install protection against mechanical injury—with intent to damage aforethought! In other words, why not equip these suits with a small invisibility apparatus? We have it on the ship, and we can install it on this. Also—it is something to do."

"Great idea, Arcot—if you can find room in that case!" said Wade, looking doubtfully at the neatly, but decidedly filled case.

"Oh, we won't add anything but a few tuning devices really, and they don't take a whale of a lot of power, remember!"

Arcot pointed out the places they could be put; also he substituted some of the old induction coils with one of his new power storage devices, and got far higher efficiency from the tubes.

But principally, it was something to do.

Indeed, it was so thoroughly something to do, that four hours had sped by before they realized it, and they were over 450,000 light years from the Galaxy before they noticed it! On discovering this, they decided that they might just as well wait till the full half million light years had passed. It was not long after, then, that they changed back to their control room positions from the laboratory.

Arcot reached toward the little red switch that controlled the titanic energies of the huge coil below, and pulled it back a quarter way.

"There go the ghosts!" he said—and indeed they quickly disappeared, seemingly leaping away from them at terrific speed, as, the curvature collapsing, the round circuit of 'space,' that bit of space they had enclosed themselves in, opened out more and more, and the distance became greater. They were further away from themselves!

One-quarter at a time, lest the sparks again fly about in the atmosphere of the ship, Arcot cut the power to zero, and they were standing once more.

They hurriedly dove to the observation room, and looked eagerly out the window.

Far, far behind them, floating in the marvelous black of space, the soft, utterly black space behind them, there was a shining disc, a disc of glowing points that seemed somehow, not far, but close, merely small. The area of all our Galaxy had contracted to a glowing disc, that seemed scarcely larger than a dinner plate, perhaps five feet outside their window. So perfectly clear was their view through the lux metal and the black of space, that all sense of distance was lost. It seemed more a miniature of their universe, a model—a tiny thing that floated close behind them, unwavering, shining with a faint light, a heatless illumination that made everything in the darkened observatory glow very faintly, showing bare outlines, the light of three hundred thousand million stars at a distance of 30,000,000,000,000,000,000 miles. But it seemed more the light of some wonderfully constructed model, for here was no relative thing, nothing with which to compare it.

"And that is huge," said Arcot softly, looking at it, after a long time of silence. It was an amazingly beautiful thing, that tiny, floating disc of light.

"We must take photographs," said Morey, rising at last, and floating across to where the cameras were located. He took several feet of orthochromatic pictures, on the six by four inch film, thus getting many images in a short time. Then he took a long time-exposure film and started to put it in the camera, then turned in disgust. "We can't take an exposure from this darned ship. It is moving."

"Wait—can't we? Think—we are moving about sixteen thousand a second directly away from it—and we are now over thirty quadrillion miles from it, if our calculations are right. The contraction with increased distance at that rate is negligible. The ship weighs 250,000 tons, and is held by gyroscopes, we won't shake it—go ahead," said Arcot.

MOREY took the plates. Then he turned to the telectroscope, which Wade had already put in service. The universe behind them glowed more brightly now, spread over the entire screen in a dotted pattern of shining points. Arcot was trying to make angular measurements. This he found impossible, for though he recognized S Doradus, and because of their tremendous radiation, the giants Betelguese and Antares, yet they were too close for measurements. The angle subtended was too small. Finally, taking the radius of the universe as his base, he calculated their distance. It came out to be almost exactly 500,000 light years, just exactly five times the diameter of the Galaxy. They studied the universe from here for a long time. At last they swung the ship about its axis, and looked ahead for a landing place.

The nebulas ahead were still invisible to the naked eye, except as points, but the telectroscope finally revealed one that was decidedly nearer than the rest. It seemed a young island universe, for there was still a vast cloud of gas from which stars were yet to be born in the whirling center—a single titanic gas cloud that stretched out through a million billion miles of space—stars to be!

"Shall we head for that?" asked Arcot at last, as Morey finished his observations.

"I think it would be as good as any—there are more stars there than we can hope to visit!"

"Well, then—here we go!"

Arcot dived for the control room, while Morey shut off the telectroscope and picked up the latest photographs, storing them in the file.

Suddenly space was snapping about him—they were off again. Another shock of surging energy—another—the ship was leaping forward at tremendous speed—still greater—then they were rushing at top speed, and beside them ran the ghost ships of the *Ancient Mariner*.

Arcot stared in amazement, his face suddenly clouded in wonder, while Morey stared in equal wonder . . . "Lord," muttered Morey, as he looked at the ships, "where can they have come from?"

"We are off for a while now, our next stop is the Universe, and since it is quite a distance off, I think we had best stop at the end of four days, make more accurate measurements, and then stop nearer. In the meantime we must arrange shifts. I think that I will go to sleep now and take over the shift in—say, ten hours. To do that I am going to take a mild opiate I brought along in the medicine case, for just such an emergency. We stand ten-hour sleep-shifts—the rest wide awake, and working," he said, as he glided into the control room, where Arcot, Wade and Fuller were just getting ready to start for the lab.

It was agreed, and in the meantime the three "on duty" went down to the lab to work. Just what need of a watch there was, none of them knew—but they soon found out!

Arcot had finished his invisibility installation at the end of the ten hours, much to his disappointment. He was casting about for something else to do, while Wade and Fuller were putting the finish-

ing touches on theirs. He had tested his, and found it worked perfectly.

Morey came down, and when Wade had finished his, which took but another quarter hour, he took the "off duty" shift.

Arcot had gone up to the library, and Morey was at work down below. Fuller had come up, looking for something to do, and hit on the excellent idea of fixing a meal.

He had just about begun his preparations in the kitchen, when suddenly the *Ancient Mariner* gave a violent leap, and the men, not expecting any weight, suddenly fell in different ways with terrific force! Fuller fell half the length of the galley, and was knocked out by the blow. Wade, under the opiate, was brought to violently by the shock, and Morey, who had been strapped in his chair, was shaken violently.

Every one cried out simultaneously—and Arcot was on his way to the control room. The first shock was but a forerunner of the storm, for suddenly the ship was hurled violently about, the air in the room was shot through with great burning sparks, the snapping hiss of electricity was everywhere, and every pointed metal object was throwing streamers of flame into the air! The ship rocked, heaved, and cavorted wildly, as though caught in the play of titanic forces! Scrambling wildly along the hand-holds, Arcot climbed into the control room, now above, now below, now beside him, he worked his way up, frequently getting severe burns from the flaming sparks; the relays down below were snapping in and out wildly—then suddenly the control room ahead was lighted with a strange glow—Arcot was almost there—and he continued to struggle on.

Suddenly he cried out in amazement, and sudden fear:

"COSMIC RAYS! HIGH CONCENTRATION! Get up the screens!"

Below he heard Morey's shout, and the chair before him was suddenly leaping up at him—he grasped it—and quickly snapped himself into the straps. A tingling warmth pervaded him—a strange heat—his hands glowed green, he heard strange sounds, smelled mingled odors, stenches, and sweetest perfumes weirdly intermingled, while all the Universe was suddenly a strangely flashing mass of color. His hands moved strangely—jerkily—he could not think, his mind was chaos—his hands, his arms, his legs refused to function. Then, with a sudden effort, he reached a small switch—pulled it—and even as he did so, he gasped suddenly, and slumped unconscious in his seat, his face glowing green, his arms, his hands strangely phosphorescent. The instruments before him were strangely colored, glowing. The very walls were active and the cables seemed smoking. Then there was a whirring, and a dull click as the lever he pulled set in motion the motors that threw heavy relux screens across the windows of the pilot house, the engine room, the observatory—the very window—or should have.

The strange lights died, and he seemed normal, breathing once more, as the ship whipped about madly, the flashing sparks still shooting out wildly.

There was a sudden crash, and a fuse went out below—a fuse made of a silver bar two feet thick! The main power coil was cut off. In an instant the flames of the burning sparks flared up—and died. The ship cavorted, shaking mightily in titanic, cosmic forces, the forces that made the highest energy form in the universe!

Arcot suddenly straightened—below he heard the cries of his friends—Wade was up now, and working desperately.

He saw that nothing could be done with the power coil. It was drained, the circuit was broken. The molecular motion—he shifted it in, throwing every available power unit on, yet keeping the power down to four gravities.

"*Shut that off!* Arcot—shut it off—we have to place screens!" the call from the others reached him.

Arcot shut off the power, and made his way through the leaping ship, down to his friends, into the lab, and through to the wildly plunging power room. The powerful ship was being tossed about, the plaything of inconceivable forces. They lived only because the forces did not try to turn the ship more suddenly, not because of the strength of the ship, for nothing could resist these awful forces.

IN the power room Arcot saw, with dismay, that the screens had not functioned. Like a solid beam, a great stream of cosmic rays was coming in the lux metal window, streaming across the room, and playing on the all-important switchboard, while before his eyes he saw the instruments on it disintegrating! They glowed strangely, while he smelled the burning insulation of the relays, the strong odor of the heated rubberoid; the great panel of lux metal, a perfect insulator, was safe, but the wires behind it, which operated the relays, were going! The cosmic rays were heating them, disintegrating them.

Arcot felt weak. He could not think clearly. He struggled across the heaving room, to where the other three were working desperately at the screen mechanism, the motor contacts had been destroyed; they were trying to wire around it, trying to get the motor to function once more—then suddenly the room was dark, except for a faint glow from the switchboard.

"God—the power's gone!" Arcot let himself fall, when possible, toward the door, then quickly he was in the laboratory, calling to his friends to stay where they were. Then he was falling back, taking advantage of the bucking, changing motion, at last falling toward his friends, now with a cosmic ray power flashlight, a light that operated at the standard voltage of 50, used everywhere on the ship, and in his other hand he held a powerpack. Quickly he stripped the wires, connected them to the stubborn motor—threw the switch, and at last the screen was in place.

The light of the flashlight showed them a deadly truth. The switchboard had been half-disintegrated; the cosmic rays had eaten it away like some acid. The room was hot now, unbearably so, and the air was growing bad, for with failure of the power plant, the last power had gone out. The lights, the molecular motion air cooler, the ventilation fan, the air cleaner—all were off.

In the light of that same flashlight, white and clear, they saw that Arcot's face and hands were red and inflamed. Wade had been working in that ray first and his hands also were badly burned, the terrible cosmic ray burns. But Arcot had gotten the worst attack.

"I-I'm about out on my feet. I've got to go up—take the—do the best you can—Morey!" Arcot started toward his room, but fainted before he could leave the room. Wade leaped after him, and caught him before he fell in the wildly bucking ship.

Feverishly Morey and Fuller set to work. They inspected the main power unit. It was working perfectly, but the power leads were gone at the power board.

From the laboratory they brought auxiliary leads, and wired around all the switches, and turned the molecular power on at four gravities, after shouting a warning, and using the compass gyroscope, the only one not twisted far out of its original position. After this they maintained a fairly straight course, steering by the dangerous expedient of changing the leads.

They were working fast—still the bucking ship

seemed always off the course, and this, naturally, was slower than the regular controls.

"The relux screens will turn the cosmics if they are alone—but may God help us if these rays are aided by a magnetic field," said Morey in a low voice. Indeed, though the relux would throw the cosmic rays off, if unhindered. With a magnetic field, as they might well be influenced by it in this field of cosmic forces, the relux would absorb the rays, and their energy, as electricity, would become heat, and they would be lost!

Suddenly Wade returned. "Strapped him into the bed—no time to treat him."

Quickly he grasped the leads Morey indicated, and set to work with them, Morey working the vertical twists, Fuller the side twists, while Wade worked on the restoration of the auxiliary power unit. In a few moments he had it pouring its energy into the great coil-bank, charging the coils, for all their energy was out. They were unable to use the space control.

Another silver bar fuse was inserted, and Wade worked at the space controls, the relays had been undamaged, for they were in another room, with the power coils, but the power distribution room had been disintegrated by the rays—the controls were gone, and power without the controls was worse than useless!

For half an hour they worked. While Wade was fast replacing the destroyed instruments that were absolutely essential, Morey and Fuller guided the ship, as best they could.

At last Morey was able to leave his work, as a guiding gyroscopic apparatus was reconnected through the new leads Wade installed, and then the two men quickly had Fuller's leads released. The molecular cooling apparatus, and the air cleaner, purifier and ventilator had been started, as had the lights. Now they turned all available power from the main unit into the great battery of coils. Still it would take nearly another three-quarters of an hour before they would be ready to operate.

The makeshift leads were not safe, and as rapidly as possible now, the men bound them in place—out of the way, where they could not mutually interfere.

New relays were being inserted in the undamaged panel; the lux metal had not suffered; only the "electricity metals," as they may be termed, that made the instruments. As rapidly as possible these were put in service, handicapped as they were by the heavy power they were using. They had partly overcome the four gravities by using the power suits to move about in.

Another half hour had sped by as the bucking ship forced its way through this terrific field of force.

Suddenly they felt the terrific jolt again—then the ship was moving smoothly, and gradually it was calm! They were through!

"I'm going to try the space control power!" called Morey. Quickly he ripped out the temporary molecular motion connections, and then threw in all the space-control power he had. The ship was suddenly supercharged with energy—it jarred suddenly—then was quiet. He allowed ten minutes to pass, then he disconnected the power and threw the ship into a halt.

"We should be about 200 light years from there now. Come on. We can only try. I am going to let Wade and Arcot, who have burned hands, go for a little attention. You stay on the job Fuller—I don't think there will be any trouble. It was luck that we didn't meet some magnetic fields in there!"

MOREY treated Wade's hands with a preparation of the Venerian medical profession, tharnilite, as Terrestrians called it, which caused the wounds to heal in less than twenty hours, if the blood was still flowing normally, as it was in this case.

Then he looked at Arcot. Arcot had been badly burned. Morey had feared cosmic ray burns—from other sources—and had brought along a number of remedies that their brief experience had shown to be effective. He used these liberally—and finally administered a general remedy of the latest terrestrian medical science—an anesthetic that held the patient in a coma for about thirty hours, during which time the sleep was, instead of refreshing, very fatiguing, for the body's entire energies were expended in repairing the damaged tissues, and the body awoke repaired, but tired, to fall immediately into a natural sleep. Into the bargain, a strong nutrient solution was included, to give the necessary energy.

Then he turned his attention to his own burns, and to Fuller's.

It was a humming ship that Arcot awoke in. The sounds of work were plainly audible from below. He felt very weak, and very hungry, but he recognized the symptoms, and remembered his last surroundings.

He went down to the galley, and quietly prepared himself a hearty meal and ate. Half an hour later he joined the others in the lower deck. They were busy reconstructing the destroyed switchboard. They had nearly finished the work now. He had been asleep for forty hours. They were installing the leads to the control room above, the installation was finished below, and all relays had been checked over. It was well for them that they had brought plenty of spare parts!

Ten hours later Arcot was running the ship smoothly at top sped once more. Behind them the others were sleeping heavily—and they had not used any opiate this time! Arcot had two days more before they would stop to make the final observations. They had reset their course, and were off to the other universe.

To Arcot time dragged heavily once more, for there was little to do, now that all the repairs had been made, so he decided that they would want to make a thorough inspection when the others awoke. They had not inspected the outside for possible damages. The terrific strains might have opened cracks in the external surface that would not be detectable from the inside, because the inner wall was separated from the outer envelope. Accordingly he got out their power suits, and the altitude suits, making sure that the oxygen tanks were full, and all was ready. Then he went into the library, got out some books, and set about some calculations he had in mind.

Morey woke first, fifteen hours after going to bed. He found Arcot still at work on his calculations.

"Say—I thought you were going to be on the lookout for more cosmic rays!" he said, swinging himself into the chair beside Arcot.

"Curious delusions, wasn't it?" asked Arcot blandly. "As a matter of fact I have been busy doing some calculating. I think our chances of meeting another such region is about one in a million million million million. Considering those chances, we will not worry. I still don't see how we ever met one, but then—well, we just had a better chance of hitting one, than of hitting two."

Just then Fuller stuck his head in the door.

"Oh," said he, "so you're at it already? Well, I wonder if one of you could tell me just what it was we hit? I have been so busy, I haven't had a chance to think."

"I know what I think we hit, and I also know what I think of a designer of ships who makes screens that don't work," said Arcot caustically.

"And I know what I think of men who tell the designers how to make the screens that don't work, and then yell about it afterward," replied Fuller, calmly, for Arcot had suggested both the screens and the method of installation.

"Well—we'll forget that." Arcot made a deprecating gesture. "At any rate, it was really the fault of the workman in not shielding the lead wires as he did the motor. I remember telling him to put shields over those wires; all the others were shielded.

"At any rate, what happened was easy to understand. As we sailed along through space so nicely, we came to a region in space where cosmic rays are generated. It has been known, since Millikan's discovery, that they came from outer space, from between the universes, but their origin was a mystery—and since they were heavier than the hydrogen atom, they were hard to account for.

"I think I know their source, but I believe I will merely say that they are created here. I want to do more work on this. My ideas for that energy greater than any other in the universe has been confirmed.

"At any rate, they are created in that space, a perfect vacuum, and the space there is distorted terrifically by the titanic forces at work. It is bent and twisted far out of the normal, even curvature, and it was that bumpy spot in space that threw us about so. When we first entered on the space control, we hit it, and the space about the ship, distorted as it was, conflicted with the region of the cosmic ray generation and the ship lost out; the curvature of space that the ship caused was just ironed out to suit the space already there, and the tremendous surges of current from the main power coils, back and forth to and from the storage coils, caused the electrical discharges that kept burning through the air. I got several little punctures myself. I noticed that Wade and Morey had some also—yes—I see you have a number, too, Fuller. The field was caused by the terrific changes of the current. The magnetic field, set up by the rushing current, caused the walls of the ship to heat up, due to the generation of electric currents in the walls.

"Then the fuse went out. Before then the cosmic rays could reach us only when the coil was discharged. As long as we were curving space, we were safe from rays. After they blew the fuse, though, the ship was bathed in rays continuously, and although the relux walls would turn the rays, the windows passed them. We were swiftly drifting under momentum toward the exact center of the region, and the rays grew more and more intense. Their disintegration effects were very weak at first. When I entered the pilot room, I felt only warmth. After that, as the rays got to work, I felt very peculiar." Arcot described to them the strange sensations of sound, heat, cold, pain, light, odor and taste, of motion, and his inability to make his muscles obey, or his brain to work properly while exposed to the rays.

"You see, the cosmics were penetrating my brain, and disrupting atoms in there, with the result that the nerve cells were stimulated. The rays were still weak, fortunately, and so I lived through it, and the cells were not sufficiently disintegrated to make me lose my mind, although a few things rather surprised me this morning. I found I could not think of certain words! And there were some ideas that were badly jumbled, but I am all right now, I hope! That cosmic ray is bad medicine." He paused, and looked down at his hands, which still showed spots of red.

"Of course, the disintegration of the switchboard is obviously due to the rays, and their atomic effects," said Morey. "Unfortunately, the screen was not working. You see, those relux screens weren't so useless!"

"I'll say they weren't. But I want to ask you, Morey, why you went ahead, instead of turning and leaving the way we came?"

"We came into that region at the velocity of twenty-three light years a second; until we hit the curved space we maintained that; after that, for some minutes, we continued in spots at that speed—the top speed of the space control.

"I don't agree with Arcot that we were going toward the center; I think we had passed it, and were then going toward the outer edge, which was more intense than the center. The severe jolt we felt when we hit it, coming in, made me believe that. I knew that we had come a long way, and it would be better to chance going ahead, than retiring, over a way that was known to be millions of miles. It worked out, you see."

"It was lucky for us it did," said Arcot. "The walls of the ship might well have been badly strained in that field of terrific force. As a matter of fact, I was worried about the idea, and I have been wondering if we might not well have strained even the tremendously strong walls of the ship? Remember, that it might well have been in two 'space waves' at once. The mechanical strain of the two regions would have given a resultant velocity, or rather acceleration to the ship, but would have strained the walls with a force amounting to hundreds of thousands of tons. I laid out the suits up in front there, and I think that we might reasonably get out there and take a look at the old boat. Wade, as last to—well, well—there he is. My, what an energetic fellow!" laughed Arcot, as the huge form of Wade floated in through the library door—he was yawning sleepily, and rubbing his eyes. It was evident he had not yet washed, and the ferocious, and growing beard, which was springing black from his cheeks testified to his need of a shave. The others had shaved before coming in here.

"Wade, we are going outside, and we have to have someone in here to work the airlock, and to open it when we come the other way. Suppose you get to work on the hirsute adornment; there is an atomic hydrogen blow torch down in the lab, which you can use, if you wish, and we will step outside.

"You have good sense—so don't be foolish enough to start away with a little acceleration, as a joke. If you do, we will be left behind, and just try and find us in the vast immensity of inter-galactic space! You would never do it, and we would promptly be left there forever. I don't think you would—but I'm saying it, anyway—I prefer to be certain," said Arcot seriously. Indeed, it would not be a pleasant idea to contemplate—being left alone in the immensity of space. Each of the suits was equipped with a small radio set by which means they could communicate with each other, and with those on the ship, but not over a distance of more than fifty miles. A mere step in space!

ARCOT and Morey and Fuller went out, and got the suits, and got into them, while Wade went into the control room. He had been waiting but a few moments when Arcot pushed the signal button in the airlock, and Wade at once started the pump. In a minute and a half the airlock had been exhausted to but a few millimeters of mercury, and the remaining gas was allowed to escape into space, when Wade opened the door, electrically.

A moment later he saw Arcot float up and past him, past the control room window, and through the loud-speaker in the room he heard him call, while he saw him wave. The effect was peculiar, as the loud-speaker was behind him, the voice came from behind, although the man was in front of him.

"O.K., Wade—they are coming."

"Hello—you look like a balloon—or an old knight!" he laughed, as the bulging suit of the man floated by, weightless in space, falling only very, very slowly to the ship, and his present velocity, indeed, was greater than the needed velocity of escape of this tiny "planet"—or better—meteor. They were going on the molecular mo-

tion now, but as they were using no power, the men floated beside the ship, quite weightless.

"Squire, give me the can opener! I've a flea in my night shirt!" came the deep voice of Morey, who just now drifted into sight.

"You should talk! You're no graceful gazelle yourself!" retorted Arcot.

"But graceful or not, I'm going to try an experiment. Light pressure is not very great, but I wonder if the cosmic ray pressure ought not to be fairly considerable. I brought along a cosmic ray pistol, and I am going to fire it toward the nebula we are aiming for—the ray will get there in another eight or nine million years—and see if there is enough of a 'kick' from a ray pistol to affect me out here in space."

"Fire it the other way, Arcot. That isn't a fair test. Remember, the mass of the ship is not inconsiderable, and it will have some gravitational attraction. Fire it the other way and you will be overcoming gravity, and the test will be fair," said Morey.

"Right you are—here goes!" Arcot switched on the rays at full intensity, invisible in space, however, as the men watched, he actually did change his motion. The mass of the cosmic ray quantums, as great as hydrogen atoms, shooting out at the speed of light, gave a very appreciable reaction.

"See—it works!" he called.

"It does—now let's see you! We are out here to inspect the ship!" called Fuller, now floating down toward the ship, under the gentle impulse of his molecular hand power unit. The main unit was off, but the hand power unit made it possible to move easily.

The others turned to now, and set to work, examining the shell for possible signs of strain, using their powerful flashlights; equipped with cosmic ray plates, they were more nearly searchlights, but due to the lack of gas here, the rays were absolutely invisible, save when they actually hit the relux, and at such an angle that they were bounced back right into the eye. The smooth relux, reflecting one hundred per cent of the light, did not become illuminated, for illumination is the result of scattering of light. It was necessary to look close and pass the beam of light over every square foot of the ship's surface. However, the crack would be rough, and hence would scatter light, and be even more readily visible than otherwise.

To their great relief, after an hour and a half of searching, none of them had found any signs of a crack, and they went back into the ship, and resumed their voyage once more.

AGAIN they were hurtling through space, the twin ghost ships following them closely. Hour after hour the ship went on. Now they had something else to do. They were at work calculating some work that Arcot had suggested, in connection with the velocities of motion that had been observed in the stars at the edge of the universe which they were approaching. Since these stars revolved about the mass of the entire universe, it would be possible, by considering the motion as in a pure orbit, to calculate the mass of the entire universe, averaging the values of several stars. Their results were not exact, but reliable. They found this universe to have the mass of twenty-five thousand million suns, or a good bit less than one-tenth the mass of our own universe.

Still the hours dragged as they came gradually nearer their goal—gradually, despite their speed of 29 light years a second!

At the end of the second day after their trouble with the cosmic ray field, they stopped for observation. They were now so near the Island Universe, that the stars spread out in a huge disc beneath them.

"About 300,000 light years distant, I should guess," said Morey.

"We know our speed fairly accurately, why can't we calculate the distance between two of those stars and then go on in?" asked Wade.

"I think that is what we will do. Take the angle, will you, Morey? I'll swing the ship," said Arcot. Morey was a more accurate manipulator than Arcot, so the job was delegated to him.

They then advanced for one hour, and knowing this distance from experience, they were able to calculate the diameter of this universe. It turned out to be of the order of 60,000 light years.

They were now much closer. They seemed, indeed, on the edge of the giant universe, the thousands of stars flaming bright below them, stretching across their horizon more and more—a universe the eye of man had never seen before at such a distance! This universe was not yet condensed entirely to stars, and in its heart there still remained the vast gas-cloud that would eventually be stars, planets, and worlds. The vast misty cloud of light was plainly visible from here, glowing with a milky light, like some vast, frosted light bulb.

It was impossible to conceive the size of the thing, it looked only like some model, for they were still over 250,000 light years from it.

"I think that we should be there now in about three hours. Suppose we go at the full speed for two hours, then change to low speed?"

"You're the astronomical boss, Morey. Shall we start?" replied Arcot.

"Let's go!"

They swung the ship about once more—and then they were started again. As they drew near to this new universe, they began to feel more interest in the trip—more things were to happen!

The ship was going again—full speed. They could not watch the stars ahead now, as they plunged along, the universe rushing ever nearer. The two hours dragged slowly, then they were stopped once more.

About them they saw great suns shining. Indeed, one was so close they could see it as a disc with the naked eye—but somehow the entire sky was misty; they could not see clearly, and stars that were not close were blotted out. The room seemed to grow warm. They looked, puzzled, in an effort to find the cause.

"Hey—your calculations were off! Here we go!" called Arcot. Suddenly, the air snapped—and they were flying at low speed once more. The entire space about them, they noticed, was only lit with a dim glow. In ten minutes the dim light was gone—they were going again out in ordinary, dark space, with its star-studded blackness. The stars seemed the unusual, rather than the usual thing now.

"What was the matter with my calculations?"

"Oh, nothing much, Morey—only you were about thirty thousand light years off. We landed in the middle of that universe. That was a gas cloud we were in, a cloud of nebular gas, the stuff that stars are made of, and we were plowing through it at the rate of sixteen thousand miles a second. It was sheer luck that we didn't come near any stars in the process—that is, any nearer than a hundred million miles or so. If we had—well, that would have meant we would have had to recharge the coil, at least, and in the meantime, we might have hit that said star.

"However, we got into the nebular gas, and then out again. While we were going on the molecular motion, we were plowing through that gas, and naturally we got a bit hot," said Arcot.

"It seems we did. The only thing I can't understand was why we didn't turn into a nice hot cinder," remarked Fuller.

"Principally because that gaseous nebula comes nearer to being a perfect vacuum than we can obtain by means of our pumps," replied Arcot. "It is very dense—compared with 'empty' space, yet it is a mighty good vacuum. That is why we lived to tell the tale, though, as a matter of fact, I don't know the melting point of lux metal, if it has any.

"But now we are out of that, let's see if we can find a planet. We have no reason to take any photographs, we will never be able to find this particular sun again, unless we badly want to, and if we do, we will be able to do so by taking leave of our friends—or enemies, as the case may be. Then the other expeditions that are sure to follow will have their job cut out for them.

"I am stopping, and I'll leave it to Morey to find the desired star."

THE space about them was again turning wildly as the energy drained out of it. Then the stars were shining clearly before them, and about them. Arcot swung the ship about, so that the observatory pointed in their line of flight. At 16,000 miles a second, it would have taken hours to turn about without killing themselves under the pressure of the centrifugal force. Nevertheless, it was easy to spin the ship, without developing any great strain.

Morey set to work at once with his telescope, trying to find the nearest star of spectral type, G-O, the type of our sun, as had been agreed on, and he was also anxious to have it of about the same magnitude, or brilliance. At last, after investigating several such suns, he discovered one which seemed to fulfill all his wishes. It was of the correct spectral type, and of magnitude 4.87—as closely as he could determine hastily. He was a little thoughtful as he looked at this value—there was something about it that worried him, it seemed. However, he announced his result to Arcot. The ship was turned—and they were started for the adventure they had really hoped to find!

As they rushed through space, the distorted stars shining vividly before them, they saw the one which was their goal, a bright point on the crosshairs of the aiming telescope, slowly changing.

"How far is it?" asked Arcot.

"About ten light centuries," replied Morey, watching the star eagerly.

They drove on in silence—Morey was watching closely as they flashed through the past time of the star. Suddenly he cried out:

"Look—ah—it's over—gone!"

"Why—it's gone!" said Arcot in surprise. "It was shining there, then suddenly it flared more brilliantly and in an instant it was gone completely!"

"A nova! It flashed up into its sudden brilliance, as they will, and flared for perhaps a year, then it was gone forever, sunk into a slough of dimness. That star was of G-O spectral type, and of magnitude 4.87. Now it has been known for many years—since about 1925—that any star of the type G-O must be brighter than magnitude 4.88 and dimmer than magnitude 3.54 to be stable. If it is not within those limits, it changes precipitously. This star was of 4.87, according to my observations. As a matter of fact, it must have been of magnitude 4.88. While we drew near, we saw it make that precipitous change. In this case, it must drop through many, many magnitudes, and change to a white dwarf. It is still shining, but now it is a white dwarf star, such as the companion star of Sirius was. I had forgotten the Negrians removed it. Remember—it was nearly the same weight as our sun—yet gave off but one four-hundredth of the light.

"That is what has happened. That star is now a white dwarf, and shines dimly. In making that precipitous change, it naturally had to shrink, as we see in the typical case, Sirius B. In doing this, the matter falling together was forced to radiate energy, which caused the sudden flare. Most of the energy of falling, however, was absorbed by the matter of the star itself, in increasing its temperature from that of a yellow star, to one that shines blue-white.

"I want to investigate. You know that was a yellow star." Morey stopped meaningly. They were thinking of the probable fate of the beings who might have been living on the planets of such a star!

Suddenly there loomed before them the dim bulk of the star, the disc already, and Arcot snapped the ship to the molecular motion at once. He knew they must be close indeed. They stopped, and before them they saw the angry disc of the flaming star, flaming violet before them, for it was white, and their velocity of approach made it seem violet.

Arcot swung the ship a bit to one side, running in close to the flaming star, yet it was not exceedingly hot, for despite the high radiation per square inch, the total radiation was small, due to the rather small area.

They swung about the star, and the time needed to slow to a stop was rather annoyingly great, for several hours were required to reduce the speed. Arcot swung the ship about the sun in a parabolic orbit, for at their velocity, the star could not hold them in a planetary orbit.

"I'm swinging in close, so that I can get directly behind the star, and use its attraction as a brake. It will be several times Earth gravity, and we can add over and above that a molecular braking of four gravities.

"Suppose you look around and see if there are any planets. We can break free and start for another star if there are not." This was from Arcot.

Morey rose, and went to the telescope room, and swept the sky with the telectroscope. It would be hard to detect a planet when the light was so dim.

But he found one. A dark, dimly shining globe, cold as death he knew it must be. He took angular readings on it and on the dim shining sun. A little later he took more readings. It was not accurate, but he decided with a bit of a chill, that it was practically 95 million miles out. He turned his telectroscope about, and found several other planets. He realized that these, too, were not far from the arrangement of old Sol's planets. He could not see any further than five hundred million miles from the sun, for they were far too dim.

He reported to Arcot, and told him that he believed that the world at 95 million miles was their best bet. The next outer planet was too cold, even when the sun was at its normal brilliance, and the next inner planet would have been utterly blasted in the terrific heat of the Nova stage.

They were slowing rapidly now, under a deceleration of ten gravities.

They fell, under their own momentum, till they finally came out near the planet that Morey had suggested. Their momentum had been reduced by the gravity of the sun, and by their own deceleration, to less than four miles per second, when they reached the planet, and they formed an orbit about the planet, spiraling down.

Through the clear lux metal windows of the control cabin, the men looked down on a frozen world.

Below lay the unknown panorama of an unknown world that circled, frozen, around a dim, unknown sun, far in space. Cold and bleak, the low rolling hills below were black, bare rock, coated in spots with the white sheen of snow, though each of the men realized it must be solid air. Here and there ran strange rivers of deep blue, to form great lakes and seas of blue liquid. There were mighty mountains of deep blue crystal looming high, and in the hollows and cracks of these crystal

mountains lay silent, motionless seas of deep blue, unruffled by any breeze in this airless world. It was a world that lay frozen under the rays of a dim, dead sun.

They continued over the broad sweep of the level, crystalline plain now. The bleak rock had disappeared far behind them. This world was about ten thousand miles in diameter, and the gravity here was about a quarter more than that of Earth.

On and on they swept, swinging over a frozen world at an elevation of but a scant thousand feet, viewing the unutterably desolate scene of a cold, frozen world.

Suddenly, there loomed far ahead of them a bleak, dark mass of rock again. They had crossed the frozen ocean, and were coming to the land once more—a frozen land.

Everywhere lay the deep drifts of snow, and here and there, through valleys, ran the streams of bright blue.

"LOOK—!" cried Morey in sudden surprise. Far ahead and to their left loomed a strange formation of jutting, vertical columns, covered with the white burden of snow. Arcot turned a tremendously powerful searchlight on it, and it stood out brightly against the vast snowfield. It was a dead, frozen city.

They looked at it, and the car was turned, and headed for it without a word.

"People!" said Wade at last.

They spoke little. It was hard to realize the enormity of the catastrophe that had brought a cold, bleak death to the population of this world—death to an intelligent world.

Arcot watched the city ahead; finally he spoke: "I will land. I think it will be safe for all of us to leave. Get out the suits, and make sure all the tanks are charged and that the heaters are working. It will be colder here than in space. Those streams are, of course, liquid oxygen, nitrogen, argon, and probably some dissolved helium and hydrogen. There is a slight atmosphere, however, an atmosphere of hydrogen, neon, and helium, and this is chilled to about 200 degrees. We will be cooled, as we were not in space, by the chill of conduction, and convection."

The others got the suits ready, as Arcot slowed the ship, and let it sink gently to the snowy ground below the ship. There was nearly ten feet of snow and the heavy ship sank deep into it. The ship had been chilled with the cold of space, and there was little melting about it. Now Arcot turned on the powerful searchlight, and swept it down in front of the ship. In a moment there was a hissing and the snow, for a large part, volatilized and flew away, to settle solid a moment later, falling in tiny crystals with an astonishing speed, for here was practically no air to retard their fall, as the vapor, heated by the energy from the searchlight, boiled away. But there was a good bit of water snow there also, and it melted, boiling soon as the pressure was so low that it would freeze and boil at nearly the same temperature. In a short time he had melted the way about the ship open, except for a huge mass of ice. But this would not bother them.

Morey and the others came back in their suits. Hastily, Arcot donned his and adjusted his weight, with the molecular power-pack, to about ten pounds.

They went down to the airlock, opened the inner door, entered, and then using the controls here, pumped the air back into the main body of the ship. A moment later they stepped out into the snow field of the frozen world. The great bank of snow loomed high above them. They readjusted their weight to two pounds and sailed up on the molecular motion power units in their hands, up and out, into the frozen world. High above them glowed the dim, blue-white disc of the tiny sun, seeming little more than a bright star. The light about them was dim and weak, but they each carried powerful lights strapped to their chests and they flew easily along ten feet above the frozen waste of the snow field.

At last they came to the outskirts of the dead city. The vertical walls of the buildings were free of snow and they could see the blank, staring eyes of the windows' glass, and within, the bleak, empty rooms. They swept on through the frozen streets till they came to one huge building in the center. The doors of bronze had been closed, and within the men could see that the rooms on the outside had been piled high with waste paper of all kinds. They had tried to insulate the building against loss of heat.

"Shall we break in?" asked Arcot.

"We may as well. There may be some records we could take back to Earth and have deciphered. In a time like this I should imagine that they would leave some records, hoping that some race *might* come and find them," replied Morey's voice over the radio.

They flew down to the great bronze doors, looked at them, and decided it would be easier to break in through one of the windows and tear out the paper waste.

A molecular ray pistol worked for fifteen minutes tearing a way through. It was slow work, and they must keep the cosmic ray pistol working at all times to supply the necessary heat for the molecular motion.

Over everything lay that thin layer of white powder, frozen air, that testified mutely to the fact that only under the rays of the sun was there heat enough to melt it.

At last they broke through.

They entered on the second floor. Before them stretched a long, richly decorated hall, with great murals in colors. The life size paintings displayed a people dressed in a suit of some soft, white cloth generally, with blond hair that seemed to reach to their shoulders. They were shorter, and more heavily built than Earth people, perhaps, but there was a grace to them that denied the greater gravity of their planet.

And it disclosed a world of warm sunlight, of green plants, of tall trees, waving perhaps in a breeze of warm air—warm air that now lay frozen on the stone floors of their buildings.

Scene after scene they saw—then they came to a great hall. Hundreds of bodies lay here, people wrapped in heavy cloth blankets, and over the floor of this room lay little crystals of green. Wade looked at them a long time, and at the people who lay thus perfectly preserved by the utter cold. They seemed only sleeping. There were men and women and children, sleeping—sleeping under a blanket of white soft powder that crumbled, and disappeared as the energy of the lights fell on it, and that hissed under the touch of the warm suits of the Terrestrians.

THERE was one little group the Terrestrians looked at, and then they turned and left this room of death. There were three in it—a young man, a fair, blonde young woman, scarcely more than a girl she seemed, smiling, her arm about the man—and between them lay a little child. They were sleeping, warm in the arms of Death, the kindly Reliever of Pain.

Arcot turned, and rose, flying swiftly down the long corridor toward the door.

"That was not meant for us; let's leave," he said. The others followed.

"But let's see what records they left. It may be that they would want us to know their tragic story. They were wise in using that poisonous gas, thus relieving them of the struggle against the cold. But let us see what civilization they had reached."

They went down, into the first floor level.

Here was a single, great court. There were no pillars, only a vast, smooth floor.

"They had some architecture," said Morey. "No pillars under all the vast load of that building!"

"And the load is even greater under this gravitational acceleration," remarked Arcot.

In the center of the room, however, there was something. It was made of bronze, but it shone golden; it must have been new when this world froze. It had not oxidized. It was a great globe, resting on a platform of marble. The men flew over to it, and stood beside it, looking curiously at the great globe, nearly fifteen feet in diameter.

"A globe of their world," said Fuller, looking at it with interest.

"Yes, and this globe was set up here after they were

The great globe, they found, was hollow. Arcot flew up to the top of the globe, and viewed it from above. There was a carefully chiselled relief map on the smooth surface. . . . There was nothing at the top but a mass of brass.

certain the great cold would come. See how shiny it is. It would have oxidized quickly. I am sure that they put this here as an indicator, a guide to whoever might come. Let us see," said Arcot, looking at it curiously.

The great globe, they found, was hollow. Arcot flew up to the top of the globe and viewed it from above. There was a carefully chiselled relief map on the smooth surface, showing seas, and continents. There was nothing at the top but a mass of brass.

"Arcot—come here a minute," called Morey. Arcot flew down to where Morey was looking at the globe. It was the side toward the main entrance to the great building. Here, on the edge of the continent, was a small raised globe, and around the globe a circle had been drawn.

"I think this is meant to represent this globe right here—I am almost certain that they mean that this represents this spot.

"Now look here!" Morey pointed to a spot on the globe which must have been, on this larger world, nearly five thousand miles away, where a tower had been represented on a mountain.

It was done in silver, rather than bronze.

"They want us to go there; this was erected only shortly before the catastrophe, and I am sure they have relics and other things they want us to get. Little could they have guessed that the finders would be people, not merely from another star, from another world, but from a different universe, men who came ten million light years across the void, to find this little spot. Perhaps they have other maps like this in every large city.

"But I think it is our duty to visit that cairn, that monument to a lost race, and see what they have left."

"I quite agree," assented Arcot. "The chance of other men ever visiting this world is infinitely small."

"Then let's leave this City of the Dead!" said Wade. It gave them a sense of depression greater than that inspired by the vast loneliness of ten million light years of empty space. One is never so lonely as when he is with the dead, and the men began to realize that the original "Ancient Mariner" had been more lonely with strange companions, than were they in the vast depths of empty space.

They went back to the ship now, floating through the last remnants of this frozen world's atmosphere, back through the chill of the frozen gases, across the plain, and back to the cheering interior of the shining, warm ship, resting on the snow. How good it looked to them! The one spot of light, and warmth and comfort in all this vast world of frozen cold, its warm, soft light streaming out through the windows to light the snow with a soft radiance, an invitation to warmth that beckoned them strongly, as they saw behind them the bleak, cold buildings of the city of the dead.

Wade stopped, just before entering, and filled a small tube he had carried with the snow on the surface of the frozen water. He sealed it, lest the gases, volatilizing in the ship, leak out. As chemist, he would test the substance. In the room of death back there in the city he had taken samples of the solidified gas that lay on the floor.

Once more they were in the warmth and light of their ship. It was a contrast that made each of them appreciate more fully the gift that a hot, blazing sun is!

Perhaps it was this that made Fuller ask: "If this happened to a star like our sun, why not to our sun?"

"Indeed, why not?" replied Morey smiling. "It not only can, but very likely may. It is the most immediate danger that Earth stands in now. This contraction takes place when the star reaches the lower magnitude limit, 4.88, and our sun is now of magnitude 4.85. If the intensity changes, one part in thirty, we will have a sun in the same condition that this star is in."

"*What?* One part in thirty, and we will freeze just as this planet has?" cried Wade and Fuller simultaneously.

"We most certainly will. The first impulse of the human mind, after seeing this, is to say, 'Impossible, our world can never freeze like this!' which is one manifestation of that Divine Optimism that makes life worth while. If we faced life in the future, without optimistic hopes, we would all commit suicide. Perhaps it was a sort of elimination of the most sensible, that has made this an inbred feeling. All those who didn't have it, committed suicide before they passed it on to their children.

"But it most certainly can happen. In fact, it is the thing that is most apt to end our world—within the next 150,000 million years. That is the time needed for the sun, under normal conditions, to decrease in radiation by three per cent. So it can't happen before that time.

"And, to further relieve any doubts as to immediate failure of our source of light, I might mention that as the star changes three per cent in brilliance, it will also change its light, it will, then, change its spectral type. And the limits for the next spectral type the sun will reach, are from about 3.9 to 4.7, so our sun will be safe for another 150,000 million years—and so on. As a matter of fact, the chances are that it will be good for another long stretch. Of course, accidents may happen—we may hit another star, we may become entangled with an asteroid, but that is less probable now, with space ships to deflect it." Morey certainly sounded convincing.

"So, allowing that no accidents happen," he continued, "Earth ought to be able to support life for approximately one million million years—which is the probable future of our human race.

"And some people have actually tried to tell what it will be like then! That stretch of time is something like three million times as long as man has been here on Earth, and a good five hundred times the age of old Terra herself. A fair age, all in all, at that—about 2,000,000,000 years, and when humanity is celebrating its 1,000,000,000,000th birthday, perhaps they will be running all over the great wide universe in Arcot Space Control Cars. At any rate, it is pleasant to think that the name, at least, will be known to them, for records that are made now, will be preserved with the utmost care, and the machines will be remembered. And this machine must be used!"

"Perhaps—but was it someone by the name of Morey, or not, that remarked rather caustically about the people who try to say what people will be doing on the 1,000,000,000,000th birthday of humanity?" said Arcot.

They had been flying over the frozen, cold world below, Arcot piloting, following the route he had drawn out from the map in the great hall of the building back there. They had a powerful searchlight playing on the ground below, focussed in a cone, so it lit a great area of the snow-covered ground. Mile after mile of frozen ground flew by, as they shot on at three miles a second.

SUDDENLY the bleak bulk of a huge mountain loomed gigantic before them. Arcot reversed the power, and brought the car to a stop, seeking the tower, for he believed it should be here. With the powerful searchlight he swept the ground, and at last made it out, a pyramid rather than a tower, and coated over with ice. It was soon being thawed out, however, as the great energy of three searchlights was poured down upon it. In a few moments the glint of gold showed through the melting ice and snow. The sloping sides seemed built for strength, although gold, the metal used, was weak.

"Perhaps," said Wade, "they have an outer wall of

gold over a strong wall of iron or other metal to protect it from corrosion."

Arcot brought the ship down beside the tower, and the men once more got into the space suits, and climbed through the airlock, out into the cold of this frozen world. They flew across the space that separated them, and then sought along the walls of the tower for some means of entrance. In several places they noticed hieroglyphics carved in great foot-high characters. They searched in vain for a door, till at last they found that the top was level. The only joint in the walls seemed to be there, yet there was no handle or visible method of opening the door.

Arcot turned his powerful light on the surface, and searched carefully for some sign of an opening device. There was a bas-relief engraved on the panel, a hand pointed to a corner of the door. Here Arcot saw that the metal was welded to another bit of metal of another color. He looked at it closely, saw the metal was an alloy of some kind—then suddenly he felt a vibration of some sort! The door seemed working! There was a sudden click, and the heavy panel was sinking slowly!

"On it men—we can break out, if we can't break in!" Arcot leaped upon it and sank slowly with it. The massive walls of the great tower were nearly five feet thick, and of some tougher metal it seemed, white, and harder.

"Pure iron!" diagnosed Wade. "That is strong, though not as strong as steel, yet it is exceedingly resistant to corrosion.

"My mistake—this has been alloyed with silicon, which makes it harder and still more resistant to corrosion."

Through many feet they sank. Finally they were in a great chamber that was obviously a museum of a lost race. About all the walls were arranged models, books, and diagrams.

"We can never hope to take all this in our ship!" said Arcot, looking at the great collection. "Look—there is an old winged airplane! See—there is a steamship—there is a steam engine—that is an electric motor, surely. And that must be some kind of a battery they used. We cannot take all these things, and we want proof of our visit. I think we will be doing best if we take all the books we can, making sure we get the books of introduction that they must have prepared. See—that has only one mark above it—that group—the next has two straight bars—that one has three—and so on. I'll bet those are the first books there! Come on, let's each take a load. We will carry all we can of them and leave the models. I am going to leave a note, saying that we visited this world about five hundred years after the catastrophe. I can leave it in drawing language or pictures. We can't take these interesting models, but we can take photographs, and take route photographs when we leave. We will then be able to tell other men how to get back here, and investigations will be started, I am sure!"

Each of the men loaded himself with all the books he could carry. They soon found that these books were not as light as they thought, for under the greater gravity of the larger world, the books felt heavy to the arms, if not to a lightened body. They could not plow their way through the heavy snow, so they had to lighten the body to zero weight, practically, and go to the machine on the impulse of one kick.

Three loads they took, each of them, and on the fourth trip, Arcot stayed in the machine and drew his "note."

"Let's see your masterpiece!" said Morey, as they returned to the ship with their last load of books. Arcot had just gotten back into the airlock, from the library where he had been working. He had used a piece of a very tough, high-grade paper, heavy and strong. In the cold and airless world where it was to remain, there would be no chance of early corrosion.

Near the top of the paper Arcot had drawn a representation of their ship, and beneath it, a representation of the route they had taken from universe to universe. The present universe was represented with the cloud of gas, the main identifying feature. Beneath the dotted line that was their route, Arcot had written "600,000,000,000 u," then followed a little table, the numeral "1" followed by one straight bar, then "2" followed by two bars, and so on, up to ten. Ten was followed by ten straight bars, then, separated from it, a curved bar, used as an integral sign. "10" was represented, then, both as ten of the smaller units, and one of the larger units. Twenty was next, followed by twenty units, and two of the integral signs. Thus he had worked up to 100, and by the same system had made it clear to any reasoning creature, that we used a decimal system, and the zeros meant ten times. It would, he felt, be easy to understand.

Next below, he had drawn this solar system, as they had found it, and the distance from the planet they were on, to the sun—very nearly 100,000,000 miles, he had indicated, and labeled "u." Thus, the finders could reason that they had come a distance of six hundred billion units, where a distance of 100,000,000 miles was taken as the units; they had then, come from another Island Universe. Certainly any creature with enough intelligence to reach this frozen world would be able to understand this!

"This sun is only slightly less massive than our sun, and this world is at nearly the same distance from it that Earth is from our sun. Hence the year of this planet must be very nearly equal to our own. I am indicating approximately 500 years of this planet as the time after the catastrophe that we landed, and I am indicating our removal of some of the books," pointed out Arcot, indicating several of the other drawings.

THEY left this message in the tower, and then Arcot, by some means unknown to his friends, succeeded in closing the trap-door exactly as it was before they came. He flew back to the ship and settled in the air lock. They closed the door and let in the air from the ship once more. The warm air coming into the extremely cold room, was condensed to a liquid, and for some time merely ran down in frigid streams upon the floor, trickles of air. More kept coming in, trying vainly to equalize the pressure. Finally Arcot turned on the spotlights, as no heating arrangements had been made in this entrance way. In a short time, the energy of the lights being absorbed by the walls, the room was sufficiently warmed to allow the air pressure to equal that inside the ship.

"Say, how did you get in?" asked Morey of Arcot, as he realized that Arcot must have warmed the room when he came in before.

"The room had not been so thoroughly chilled then, and it was not cold enough to do this liquefaction at that time," replied his friend.

A few minutes later, their suits off, they were busy storing the precious books in a safe place, packing them in the special specimen cases that had been brought for such a purpose.

When the last of them was carefully stowed, they returned to the control room. They looked silently out across this strange, dead world, quietly thinking how much it must have been like Earth! It was dead now, and frozen forever. The low hills that stretched out, ice and snow coated, beneath them, as they sped along, perhaps a mile above the ground, were dimly lighted in the weak rays of the shrunken sun. 95,000,000 miles away, it glowed so weakly that this world received

little more heat from it than it might have received from a coal fire a mile distant.

So weakly it flared, that, in this thin atmosphere of hydrogen and helium and very rare gases, its little corona flared about it plainly, and even the stars near it glowed brilliantly. Indeed, there was one constellation, a strange dragon-shaped grouping of stars, and this little the sun seemed to be the flaming head of the dragon!

Gradually they rose, and then, as Arcot turned the ship definitely out into space, they saw its dim, frozen plains fall behind. It seemed that a load of oppressing loneliness parted from them, as they flew out into the vast spaces of the eternal stars, the blazing suns of all space. Even here there seemed less of the cold touch of frozen death, than back there on that frozen planet.

"Better take some photographs, hadn't you, Morey?" said Arcot, as they were at last about three million miles from the planet.

"All right—but let's decide now on our next stop."

They all went back to the observatory for experimentation and observation concerning other stars.

"I almost feel that I would prefer not to look for one of those yellow stars. This experience with the type G-O makes me want to steer clear of them!" said Wade, looking back at the diminishing disc of the dim planet.

"Well, if you know a better type, tell us about it!" said Arcot.

"Which reminds me that I would greatly like to know how you opened that door and how you closed it again," said Morey, turning toward Arcot.

"Oh—I didn't know how to open the door, I just opened it. It required only a considerable amount of light on that spot of greenish metal. It was a piece of metal which is sensitive to light, and proceeded to function as had been designed. It operated the door, and let us in. Shutting it was easy, for once inside, it was easy to see the mechanism, which I examined."

"But if the mechanism was so simple, any creature, intelligent or not, would be able to open it, and the precious records they left might be destroyed by some savage," said Morey.

"Yes? And how would the savage get there to open the door?" asked Arcot.

"Oh!" was Morey's comment. "Obviously, it would require a high order of intelligence to get there at all. Certainly the door was safe from savage attack! But in the meantime, let's take the pictures and get going."

"About those pictures, Morey," said Arcot. "We want to be able to find the star again, and if we go to some other planet directly, we will be able to find this sun only by back-trailing, but if we just run out to the edge of the Universe now, we will save later investigators a lot of trouble. It will take only a few hours."

"I think you are right, we can take the pictures, and then have a wider choice of stars. Well, let's get going."

They went away from this star, speeding away at their half-speed, racing back through the time of this star, back till they saw the star flame once more into brilliant life.

"Those people are coming to life now—perhaps they are building that tower—putting these books in the tower! These books are in two places at once, an observer would have to say! Visibly, they are. Now it is a world of rolling, warm oceans, where green plants —and that little group we saw back there in the room of death, are living, and growing.

"They were wise, there was no use in fighting that cold. They did not have the weapons that could stand it off, as the Negrians had. The Negrians had the energy of matter, and we have that energy now. Never can Earth's peoples be trapped thus, for we can escape now, to other stars. It is an assurance and a certainty that this ship has brought. After I saw that world, I was glad that we had been able to contribute something. With the help of this machine, mankind is forever safe from that death."

They stopped now, and took more photographs, that the path might be marked. They stopped every light century till they had reached a point where the sun was merely a point—a member of a constellation.

Out to the edge of the Universe they went, out toward their own Universe.

"Arcot—" called Morey, after their last stop within the Island Universe, "let's go out, say one million light years into space, at an angle to this Universe, and see what we can do about getting a photograph of both universes on the same plate."

"Good idea—we can go out and back in one day—and we have all time before us, and this *time* won't count back on Earth, anyway!"

Since they would continue to travel all this time, it would not be felt as Earth-time. Thus it "did not count" in the total time of their trip.

They went to the control room now, to prepare for this last move. They were to travel at their top speed of twenty-nine light years per second. The hours dragged heavily, as they had when they were coming in, and Arcot alone remained on watch, while the others went to their rooms for some sleep, strapping themselves securely in the weightless bunks.

It was hours later when Morey awoke with a sudden premonition of trouble. He looked at the chronometer on the wall of his room—he had been sleeping twelve hours! They had gone beyond the million light years. It did not matter, except that it showed Arcot must surely have fallen asleep.

He had. He was asleep in the middle of the library—exactly the middle, floating in the room ten feet from each wall, and three feet above the table. Morey called out to him. Arcot woke with a guilty start. "A fine sentry you make! Can't even keep awake when all you have to do is sit here and see we don't run into anything. We have gone more than our million light years already—and we're still going strong. Come on —snap out of it!"

"I'm sorry—I apologize—all right—I know I should not have slept—but it was so perfectly quiet here—save for your deep toned, musical snores, that I couldn't help it!" grinned Arcot. "Get me down from here and we'll stop."

"Get you down, nothing. You stay there, while I call the other fellows to see what is to be done to a sleeping sentry."

Morey turned and left to wake the others.

He had awakened Wade, and told him what had happened, and was on his way to awake Fuller, when suddenly the ship was heeling—the air snapped—the space about them was changing—they were coming out of hyperspace!

In amazement, they looked at each other—they knew that Arcot was marooned in the middle of the room—still —!

"Hold on, you brainless ones! We're turning around!" came Arcot's voice, full of suppressed mirth. Suddenly they were both plastered against the wall of the ship under four gravities of acceleration! Helpless to move, they could only crawl laboriously toward the control room, calling to Arcot to shut off the power.

WHEN Morey had left him stranded in the room, Arcot had decided it was high time to reach the floor. Quickly he looked about for means of doing so. Beside him, floating in the air, was the book he had been reading—but it was out of reach. He had not noticed till now, but his mocassins had come off while

he slept, so the Fuller rocket method was out. It seemed hopeless. Then suddenly came the inspiration! Quickly, he slipped his shirt off, and began waving it violently in the air. Almost at once he began to drift toward the wall. He developed a speed of perhaps two inches a second—not a very rapid pace, but effective—and then put his shirt on again. In a moment he had reached the wall, and it was easy to shoot himself over to the door, out the door, and then swiftly down the corridor, and reach the control room, without being seen by Morey, who was then in Wade's room.

Finally—just as Morey reached the doorway, Arcot decided it was time to shut the acceleration off, and whereas Morey had been laboring under a weight of eight hundred pounds, he was suddenly weightless, and all the strength of his powerful muscles was expended in hurling him against the ceiling. Wade suffered a like fate.

The complaints finally simmered down to an earnest demand to know how in the Universe Arcot had gotten off of "Dead Center."

"Why—that was easy—I just turned on a little power; I fell under the influence of the weight, and then it was easy to reach the control room."

"Go on—how did you get here?"

"Why—I just pushed myself here."

"Yes—no doubt, but *how* did you get hold of anything to push?"

"Why—I just took a handful of air and threw it away, and then I reached the wall."

"Oh, of course, and how did you hold the air?"

"I just took some of the air and threw it away, and reached the wall."

Which was all that Morey could learn. Arcot had kept his system secret, it seemed.

"At any rate, I am back in the control cabin, where I belong, and you are not in the observatory, where you belong. Now get out of my territory!" said Arcot. "I am turning the ship back. We have to move in this space in the direction we wish to go in the hyperspace. I will stop and let you do your picture taking."

"Let's move on a bit more, Arcot, I see that we can't get both universes in the same picture, so we can go on for say another hour, and take our pictures from that point," said Morey a moment later, after an examination of the sky behind them. Fuller had come in in the meantime, and he objected. He thought they ought to take some pictures from their present position.

"There is no particular point in that; we will have those we took coming in, and we want the wide angle pictures particularly," replied Morey, so they went on into space, shutting off the molecular power and traveling at top speed again. They planned to go a full hour more. That they didn't, was not their fault, however.

They were all in the control room, watching the instruments, and joking. Principally the latter. It happened very suddenly, far more suddenly than the cosmic ray field difficulty had occurred.

One instant they were sailing smoothly, weightlessly along, the next instant the ship rocked to a sudden violent force, the air was a snapping inferno of shooting sparks, and there came the dull thud of the suddenly volatilized silver bar that was their main power fuse. Simultaneously they were hurled forward with a terrific force; the straps that held them in place creaked with the strain, and the men felt a sudden faintness. Consciousness nearly left them—they had been burned in a dozen places by the leaping sparks—then it was over, and except that the ghost ships no longer followed them, the *Ancient Mariner* seemed much as before—save for one thing, they could now see the dim glowing universes around them.

"Lord—we came near something. Quick—it may be a wandering star. Look behind, and to the sides—" called Arcot, himself straining his eyes forward. The dark of space seemed utterly empty about them as they coasted, weightless, through space. Quickly Arcot snapped off the lights of the control room, and in a moment his eyes became accustomed to the dim light that was coming.

It was dead ahead of them. It was a dull, red glow, so dim it was scarcely visible, and yet it was within twenty million miles! Quickly Arcot realized that it was—a dead star!

"Hey—quick—Morey—here—it's directly ahead of us! It is a dead star—burned out to a cinder—and of terrific weight, I think. It must have been a giant in its day!"

In a moment Morey was with him. They were falling straight toward it, that was obvious. Arcot quickly made some changes in the molecular power apparatus, and then read certain instruments. "Lord! Look at that!" he said in a low voice to Morey. This little gravitometer told a story that was almost unbelievable. This star was over two hundred times as massive as the sun! There is just one thing to do! We can never hope to avoid that thing. We can't pull right away, that's certain, and we don't know what we have to do. We need time! We can stay here indefinitely in an orbit. I am going to try for that, but I'm not sure that I can make it. I must fall into the sun to get speed. We can't accelerate enough alone. Tell the other fellows to come here at once. We are going to use a bit of speed. Tell them to get strapped in. We are going to use all the acceleration we can stand. There is no calculating needed; we can simply go on till we don't fall into it."

Quickly the others came to the control room and strapped themselves in, prepared to stand the acceleration that was to come.

Now, had they dropped from infinity into this star, they would have been able to form an orbit very readily. Indeed, they would merely have turned around and started back, which was exactly what they wanted, but they had come into it on the space power, and at so terrific a speed, that they had gotten very close to the sun before the gravitational field had broken down their own field sufficiently to stop their space-movement. Then they had lost the energy of the field, and that had slowed them down, protected them from the gravity of this star to the extent of the energy of nearly two tons of matter. The result was that, whereas under free fall they would already have had far more energy than they needed to maintain an orbit, they were now far short of orbital speed. They must, somehow, get sufficient speed to make it.

THEY could acquire speed far more swiftly by falling into the star, than by any efforts of their own, so they were headed now for the one edge of the star, and traveling at ever higher speed. They had been traveling at a speed of 5,000 miles a second when they entered the hyperspace; this had been their original velocity, and now they were swiftly adding to it. As they dropped towards the star, their speed mounted at an astounding rate. They were using 5.5 gravities themselves, and the star was helping out with so much more acceleration that the speed was mounting at the unheard of rate of nearly eight hundred thousand feet per second per second. They were freely falling under this tremendous acceleration, an acceleration so terrific that they would have been crushed to jelly by their own weight. Even the tremendously strong lux metal would have broken down under its own weight. This weight was unbelievable, too great for imagination. An ordi-

nary needle would have been a load too great for a normal man to lift!

Their speed was mounting as they drew nearer to the star, and Arcot was forcing the ship on with all the additional speed he could get, although, as he pointed out to Morey, it was little that his 120 feet per second per second acceleration, at four terrestrial gravities, amounted to, when they were falling under 25,000 gravities! But they were also laboring under a second acceleration. Arcot was now turning the ship away from the star, so that it would move in a great parabola, which is an open curve. But he knew that their energy of motion was still far short of that hope. They could not do better than a closed ellipse now. And a closed ellipse meant that they would be forever bound to this star as a planet! Helpless, not even the titanic power of their sturdy ship could enable them to escape from the mighty star, the mass of which was two hundred times that of our own sun!

"We will establish our orbit all right, but we are going to go mighty close to that old boy in the sweep; we are in an exceedingly eccentric orbit. I am trying to make it more circular. We are diving so close that we won't graze that surface by more than a million miles, and at our present velocity of 25,000 miles per second, that means that we will be within forty seconds of that surface!"

The others were quiet. They merely watched Arcot and the star, as Arcot made swift movements with his controls, doing all he could to establish them in an orbit that would be safe.

It took them nearly two hours of careful juggling to get an orbit that they consider reasonably circular. They were rocketing over the vast surface of the star at a rate of 30,000 miles a second! And less than nine million miles from them the dull red surface of the star flamed angrily!

Now Arcot at last shut off their power. They were in an orbit, and he knew it was safe—all too safe!

"Well, I'm about worn out! That working under five and six gravities is too much for any man. We are safe now all right," he said bitterly. "We are so safe, I think we will be doing mighty well if we ever break free! We are moving about 30,000 miles a second, and that dwarf sun there is not ten million miles from us! We won't get out of this in a hurry. I think we had all better go to sleep and think about it in the morning. I'm too tired to do anything but eat—I'm ravenous. Come on, Wade—do your duty. It looks at present as if that was all we would be able to do—eat and sleep—till we are starved out." Arcot had grown pessimistic.

"Well—you may call it being safe, but I don't agree with you particularly, when we need just three hundred seconds, or five minutes, to end our careers in that miniature star there," said Fuller, looking down at their inert but titanically powerful enemy, whose baleful glow seemed even now to be burning their funeral pyre!

"Well, that, and flying off into space are two things we don't have to worry about. If we started toward the star, we would be falling into it, and our speed would at once increase. Result: Increased speed means increased centrifugal force, and we would bounce right out again. The magnitude of the force required to make us fall into that sun is appalling! We now weigh about *five million* pounds apiece, and the ship weighs about five billion tons. That represents the force of our gravitational weight, but, since we are in a very stable orbit, stabilized by that force, any tendency to change would be like trying to bend a spring which is that stiff. That force also represents the centrifugal force that drives us away from the sun. Now, perhaps, you can see what kind of a knock it would take to throw the *Ancient Mariner* into that star. The centrifugal force is calculated by Mv^2/r where M is the mass of the ship, v the velocity, and r the radius of our orbit. Gravitation varies as the square of the distance. If we move in, you say the centrifugal force is increased by the change in the radius, but the gravity is increased as the second power. Halving the radius will double the centrifugal force—yes, but it also quadruples the gravitational attraction. Then why don't we fall in right away? Principally because, when we do, the centrifugal force is affected by the increase in the velocity term also, and that is a second power term. So, while gravity goes up as the second power, centrifugal force increases as the third power, the square of the velocity, and as the first power of the radius.

"The opposite—or same reasoning, if you prefer, applies to the reverse problem, the one which so vitally concerns us. Escape. We can't do it.

"This ship now weighs five billion tons. To escape, we have to lift this ship out from this star, lift it against gravity. We are lifting a weight of five billion tons, and in order to get really beyond the range of this blamed star's gravity, we have to get about five billion miles away. As we get farther away, we will weigh less and less, as the gravitational attraction decreases. But if we lift this ship only one mile—the result is obvious. We will need such vast amounts of energy as are beyond human conception. We have burned up two tons of matter fuel recharging the coils, and we are now using another two tons, recharging them again. We will need at least four tons to spare, and as we started out with twenty, we cannot hope to get free of this star. We simply haven't fuel enough, vast as the energy of matter is. Let's eat, and then we can sleep on the problem."

They ate, and they tried to sleep on the problem, as Arcot had suggested, but it was a rather difficult proposition. They were physically tired now; they had gone through such great strains, in even this short time, that they were very tired, for under four or five times normal gravity, they felt the affects of four or five times the period under normal gravity, or better, acceleration. But sleep did come to them at last.

MOREY thought he was the first to waken, when, seven hours later, he dressed, and drove lightly, noiselessly out to the library. He sat there some time, reading a book on stars. Suddenly he noticed that the telectroscope was in operation—he heard the low hum of its smoothly working director motors.

He rose, and went back to the observatory. Arcot was busy with the telectroscope looking at different directions of the heavens. Morey waited quietly till Arcot stood up again.

"Oh—hello, Morey—I was hoping you would show up. What are your theories on this star?"

"I think it is one of those things we have never been able to see from Earth and have only 'discovered' by abstract reason. We see stars like Sirius A, which is obviously a young star, and others like Sirius B was, and it seems to be unutterably older. We see young red giants, like Betelguese, Antares, and that type, and then again there are the white dwarfs. We know that all those stars were created from the great nebula at about the same time. Then how can they vary so in apparent age? There are stars like S Doradus which radiates at such a rate that it cannot possibly have been doing this for the ten or fifteen millions of millions of years that the nebula has been composed of stars. It must have radiated more slowly in the past, and yet not all stars did. Why?

"The theory suggested only one thing. It was a case of arrested development. The theory which accounted for this arrested development was very interesting, and

it also accounted for the fact that we could not see any in this arrested state.

"If the matter destroyed in a star were the matter of its atoms, it meant the simultaneous annihilation of a proton and an electron. They could show that if free electrons could thus react with the protons of an atom, the star would be unstable, and would disappear in an instantaneous flash of light. It is only when the electron is revolving about the proton in one of the planetary orbits that the reaction can take place, that the mutual annihilation can take place. Now, if there were a star, in which nearly all the electrons had been knocked out of the atoms, where there were no atoms with planetary electrons, then in such a star, the reaction could not take place, save very slowly, when an atom happened to catch an electron. Such a star could last many millions of years and radiate little. Then one day, that reaction would take place a little faster—and it would suddenly be a star in full glory.

"Now, this little boulder down here is probably at a temperature of about 12,000 degrees, yet it can't radiate very rapidly, it is so small, in area. At the same time, it is so dense that the surface gravity has distorted the ordinary blue-white light of a normal sun, at 12,000 degrees, to a dull red, the usual slowing up of the light quantums in fighting out against that gravity. Lord, if light can't break loose, what chance would we have!"

"I think we are going to play God for a while here, Morey," Arcot interrupted. "If we don't, we are not only going to play dead, but be dead. I'll show you in a minute."

"Morey, what are the heaviest stars you know of?" he asked.

"Hmmm—Let's see," answered Morey. "In order, the largest of the red giants are Antares, with diameter 450 times that of the sun, α Herculis, about 400, α Ceti, 300, and Betelguese, about 250. Right?"

"Right—but that's not what I asked. I asked the heaviest, not the largest."

"I suppose so," replied Morey. "Antares is 90,000,000 times as large as the sun, and only 50 times as heavy. Well, there is Plaskett's star, the binary, and one of its components is 75 and the other 63 times as heavy as the sun, but there are the four stars of the system 27 Canis Majoris with masses of about 250 times that of the sun for each.

"I happened to be looking up heavy stars in connection with this monster here. It certainly is unique!"

"Ah—but it isn't," said Arcot. "I looked up heavy stars myself, shortly before you did. I found that all the known stars of very great mass seemed to go in groups that way, and were, in every case, of such gigantic mass, members of a system of two or more stars, except in the case of the red giants. All main sequence stars of giant size were in groups.

"Now, my theory is, that these stars of high weight always go in pairs. If they do—we still have a chance of life. If not—well we can profit by the example of the people we left back there. Suicide is easier than dying of cold.

"The reason we are helpless is that we have come so close to a giant sun that we can't get energy enough to pull free. We lack energy.

"But we have energy—infinite amounts of energy—potential energy, if we can only use it. We are not at the center of Antares for instance, or at the center of one of those suns in 27 Canis Majoris.

"What we need is another big, heavy sun to fall toward. Can we find one? As luck would have it, we fell into a star that is so far from the main body of the Universe, we can't very well look for help. But the size of this little pebble suggests it may not be lonely. That was what I was getting ready to look for. Come on—pitch in and help!" said Arcot, pointing to the black screen of the telectroscope.

They started their observations, handicapped by the swift motion of the machine as it swung in its close orbit about the mighty mass that held it.

They had turned out all lights in the observatory now. Then, at last, Arcot detected it—a faint glow—a tiny spot!

"Look! There is another star—near—I wonder where—we can use it if it's near!"

"Arcot—let's use the amplification of the main power board downstairs. The stars won't be in their true colors, and they will be blurred, but the increase in power alone will help. We can use those giant tubes and get a real kick behind the thing!" said Morey.

"That may help locate the stars! Come on, we'll wire it up."

WADE and Fuller joined them before they were through, and Arcot explained that they were looking for stars. They were trying to get more power now, exceeding the amplification limit, getting a poor image. An image showed something was present at any rate!

With vastly greater power, they returned to the observatory. Now, after hunting again for the star they had looked at, they saw it as a mottled, blurred green disc! They were looking at it with wonder, trying to estimate distance and size—that is, mass.

"Morey—isn't that another star, very dim, out there behind it?" asked Wade, pointing to a tiny, dim point on the glowing screen.

"It is—and there is another—say Arcot—this is more than you reckoned on!"

"It certainly is," replied Arcot. "It is a whole Universe of these strange stars that never started shining! I wonder if they are apt to exist this way for countless aeons, and then suddenly flame into life. Whole universes! The stars may be formed 'blind' under certain conditions, and remain that way till something disturbs them!

"We are in a universe of stars that haven't radiated yet! But the one that we are interested in is that star that we can see as a disc. Here is my plan:

"I believe that that star is as massive, or nearly as massive as this sun. They must be swinging about each other, about a common center of gravity, and if they don't fall together, they surely are moving—with those masses. I believe you can see what would happen if we were midway between them. In such event, we would be falling into one just as fast as we fell into the other—we would have as much weight in one direction, as the other. Result: We would be able to escape!

"We would be able to get into that neutral space, where the two gravities mutually neutralized each other, and for the millions of miles where the gravity was most intense, the two fields would annul each other, then, when we got well out from them, the fields would both be pulling us back—but the distance would now be so great, that our power would be able to pull us through!

"That is our hope!"

"Yes—and what a whale of a hope it is!" snorted Wade sarcastically.

"Are you beating Joshua? He swung the sun, and made it stand still in the heavens—this is only two hundred times as big a job!"

"And I intend to throw that star, two hundred times as big as the sun, sixty million times as heavy as Earth! And I intend to swing it into this star in such a way, that we can escape from between their twin fields! Escape between the hammer and the anvil, as millions of millions of millions of tons of matter crush into each other, falling under the weight of a gravitational ac-

celeration that will approach fifty thousand times Earth gravity! The two gravities, each twenty-five thousand times Earth gravity, will unite—and what a terrific attraction there will be!"

"And you intend to swing that!" asked Wade in awe, as he thought of the scene there would be, as those two giant suns, each far larger than any star we know well, crashed! "Well, I don't want to be around."

"What I want to do is really simple. We have the molecular ray. Those stars are hot. They don't fall into each other, because they are rotating. Suppose that rotation is suddenly stopped, completely? But what can stop the rotation of those quintillions of tons of matter? Nothing—nothing, but the matter itself. The energy that would be needed to stop all that matter would be so great, that we could not even think of it—were it not for the fact that we are going to use the energy of a mighty star to supply it. We are going to hitch our wagon to a star in an even more liberal sense. The molecular ray acts catalytically. We will only supply the impulse. The molecules will stop themselves. The star supplies the energy!

"And our job will be to break away when the stars get close enough.

"The mechanics of the job are simple—we will have to calculate when and how long to use the power, and when and how quickly to escape. Also, we will use the main power board to generate the ray and project it, instead of the little ray units. The range of the ray is theoretically infinite. With luck—we ought to be free of this star in three days!"

Work was started at once. Once more they had a chance of life in sight, and they had every intention of using it! The calculating machines they had brought were certainly going to prove worth their mass in this one use! The observations were extremely difficult, while the ship was rocketing about the star in such a rapid orbit. The calculations of the mass and distance and orbital motion of that other star were very difficult. Their final results were that it revolved with this star, the two being only slightly different in mass, as Arcot had suspected, at a separation of very nearly two billion miles. The masses of the two stars was as one to .95. Their next problem was to calculate the time of fall from that point, considering that it was stopped instantaneously, which would be approximately true. Since its inertia was made up of the sum of the inertias of the molecules, and it was these molecules that were to be stopped, individually by their own energies, it was not difficult to understand.

They had calculated that in twenty-two hours, forty-six minutes, they would be in a position that would be the most favorable to start the fall. The actual fall would take approximately six hours! The fall of two billion miles, under the titanic attraction of the two giant masses, would take but six hours! Since the stars would both fall toward each other, they would be drawn toward the falling mass, and as their orbit was completed in less than an hour, they must make sure that they were in the right position at the half way point when the fall occurred. As their orbit would be greatly perturbed as the star approached, it was necessary to calculate the perturbation and find where they would actually meet the middle point. They could regulate their position but little, for whereas the maximum acceleration they could produce was five gravities, the star was pulling them with a force 5,000 times as great. They must consider themselves practically helpless, until the two gravitational fields were neutralizing.

Arcot could have picked several points which would allow them to pull the star down sooner, since their "year" was so short, but he had chosen this way to make necessary changes in the wiring of the ray controls.

"Well," said Wade, as they finally finished the laborious computations, "I sure hope we don't make a mistake and get caught between the two! And what happens if we find that we have not stopped the star after all?"

"We won't hit it exactly the first try, but we can juggle with the ray till we do," replied Morey.

"And what if the rotational speed of the star is too great for its heat energy to overcome?"

"It won't be—it is at a temperature of 40,000,000 degrees, and if you stop to figure the rate of motion of atoms at that speed, you will see that it will more than overcome the velocity of the star. Our one trouble will be that one side of the star is going to be affected more strongly than the other. It will, however, merely cause a rotation, and we can thus get a shot at all sides. At any rate, it is our only hope," was Morey's conclusion.

THEY set to work at once, installing the heavy leads to the ray projectors. The ray projectors were necessarily on the extreme outside of the ship, in countersunk recesses in the walls of the ship. They were not affected by any physical influence, for they were actually electromagnetic field projectors, the projectors themselves being within the lux metal walls, but the fields united to produce the director field, outside the ship. To get at these projectors, to make the necessary readjustments, it was required that they go outside the ship. Morey and Wade were the ones to do this. Out in space, floating about the ship, under the attraction of that mighty sun, they still floated weightless, for they too were supported by centrifugal force.

"It is a bit warm out here, Arcot, despite the dullness of that star. I can actually feel the heat," reported Morey.

"Which means," replied Arcot over the radio from his position inside the ship, "that most of this star's radiation is in the infra-red. Heat is its main product, with light as a by-product."

The work of readjusting the projectors for the greater power was completed in an hour and a quarter, and the men returned. There still remained over twenty hours before they started their main work. Then the next ten hours would be busy ones indeed! The great storage coils had been charged to capacity, and the circuit to them was left open, controlled by the relays only. They would keep the coils charged, ready for the start.

"We are all ready, mechanically, and I think we would be wise if we were ready physically also. I suppose we aren't very tired, but we might take a little of that opiate; we are going to have a busy time when we start, and if we sit in suspense, we will be very nervous. I think we had better get a little sleep, too. If we use a mild shock to wake us, we won't oversleep," suggested Wade.

They agreed to the plan, and they prepared for their wait.

Awakened two hours before the actual moment of action, Wade prepared breakfast, and Morey took more observations. They knew just where the star should be, and they looked for it there. Morey breathed a sigh of relief—it was exactly in place! Their mathematics they were sure of, but on such a rapidly moving machine, it was exceedingly difficult to make good observations.

The two hours seemed to drag interminably, but as the last moments passed, and Arcot signalled for the full power of the molecular rays, they waited, breathless, for some response. Minute followed minute in breath-holding suspense—and still no result.

"Arcot—what's wrong?" asked Wade anxiously as the minutes passed. "It has been nearly fifteen minutes!"

"Well, be patient. We ought to see it happen in about five hours now."

"What! Five hours? And why?" asked Wade.

"Too great a distance," Arcot answered. "Two billion miles means that the light will take about two and a half hours getting here, and that our ray also took near two and a half. Result: We don't see it happen for five hours after we started the thing under way. There is a sort of chopped-off section of our ray going out there in space now, with nothing at its beginning and nothing at its end, but it will hit that star—and do things!

"Don't be impatient. We made allowance for that in our calculations, you know."

"Then how can we check the motion of that star," said Wade. "If we have to wait five hours to make sure it is doing what we want it to, and then get an impulse to correct it out there?"

"We can't work absolutely accurately," said Arcot, "but I know we used enough energy to completely, or very nearly stop it. In either case, the suns will start falling together. We are handicapped in our work, in that we can't stop the orbital motion of this thing that has us caught. It just isn't healthy, though! That star is going to start doing things! It will be chilled to almost absolute zero, however, before we get through with it, before it gets very near. It can't do much at that temperature—except expand. Which it will do. You will see the thing suddenly expanding, as it comes near, and it will flame up to a terrific temperature. We are going to start this system blazing, and if we don't get away, we needn't worry about lack of food!"

"Kind of playing with fire, I take it?" said Fuller smiling.

"Oh, sort of—about 40,000,000,000,000,000,000,000,000,000,000,000,000 tons of it, in fact," answered Arcot, nonchalantly.

"Well, I take it that forty decillion is a pretty large number, but just how big?"

"It is four with 34 zeros for company."

"It sure has a lot of company!" said Fuller, laughing.

The tension of the delay had been relieved, and they went back to the observatory to await news. There seemed to be nothing happening, however. They devoted their time to checking their position and in looking at the Universe they had just left. Finally Arcot announced that there would be things happening soon.

THEY turned the telectroscope toward the tiny pinpoint of the star, scarcely visible in the depths of space. It was glowing a very dull red on their screens. Then suddenly a change seemed to come over it. Without any apparent reason, it went out all together. The telectroscope had been set rotating at such a speed that its apparent motion was zero, so now they saw it moving across the screen as it suddenly flared violet! It was larger already, and even as they watched it, it grew swiftly larger, and at a speed that they could watch! Its brilliance was mounting swiftly; it was becoming ever more and more brilliant. Already it was a blazing point of violet light, so bright that it blurred the screen. It was a disc a moment later, and still growing brighter. Already they could see its glowing with the naked eye.

"It is happening! That star is standing still in its orbit for the time!" said Morey triumphantly, after a few minutes' work. "It is growing at a tremendously greater rate than I had anticipated, however! A star that size should radiate light at a rate that is simply unbelievable, and as it is in the condition of a white dwarf now, with a mass of 2,000 suns, and unstable, since we cooled it, we are seeing something that cannot happen in the natural universe. The Lord alone knows what that star will do before it reaches stability. Look at it! That violet light is due to two things—already it is tremendously hotter than it was, and, further, it is falling toward us, and the surface is raising at a rate that is inconceivable. I am beginning to wonder, Arcot, if we will ever be able to get within the necessary twenty million miles of its center of gravity, which is the distance we need to reach in order to escape?"

"We won't have to—the edge alone will weigh so much we will be able to get loose. But just think—that is climbing to a temperature that no matter can reach normally! When those two suns crash—well, we would never be able to escape if the space control breaks down before we are at least two light hours away! It will be radiating its light at an unheard of rate—look at that change—Morey, I think that is going through all the stages of stellar evolution in a few days! Think of the awful reaction when those two stars unite—and nothing in God's universe could stop them now. A star of that mass, when made of normal matter, would be so big that it would fill all the space between its old orbit and this other star, and it is rapidly regaining the electrons in orbital motion, and as fast as they get there, they go up in radiation—and more fall—Lord! It can't stand it! The whole star, the forty decillion tons of matter it makes, plus the forty more that make this other star, will be gone inside of a year! Our sun wouldn't last over a day. At the rate that our sun is radiating now, four million tons a second, it would last fifteen million million years!

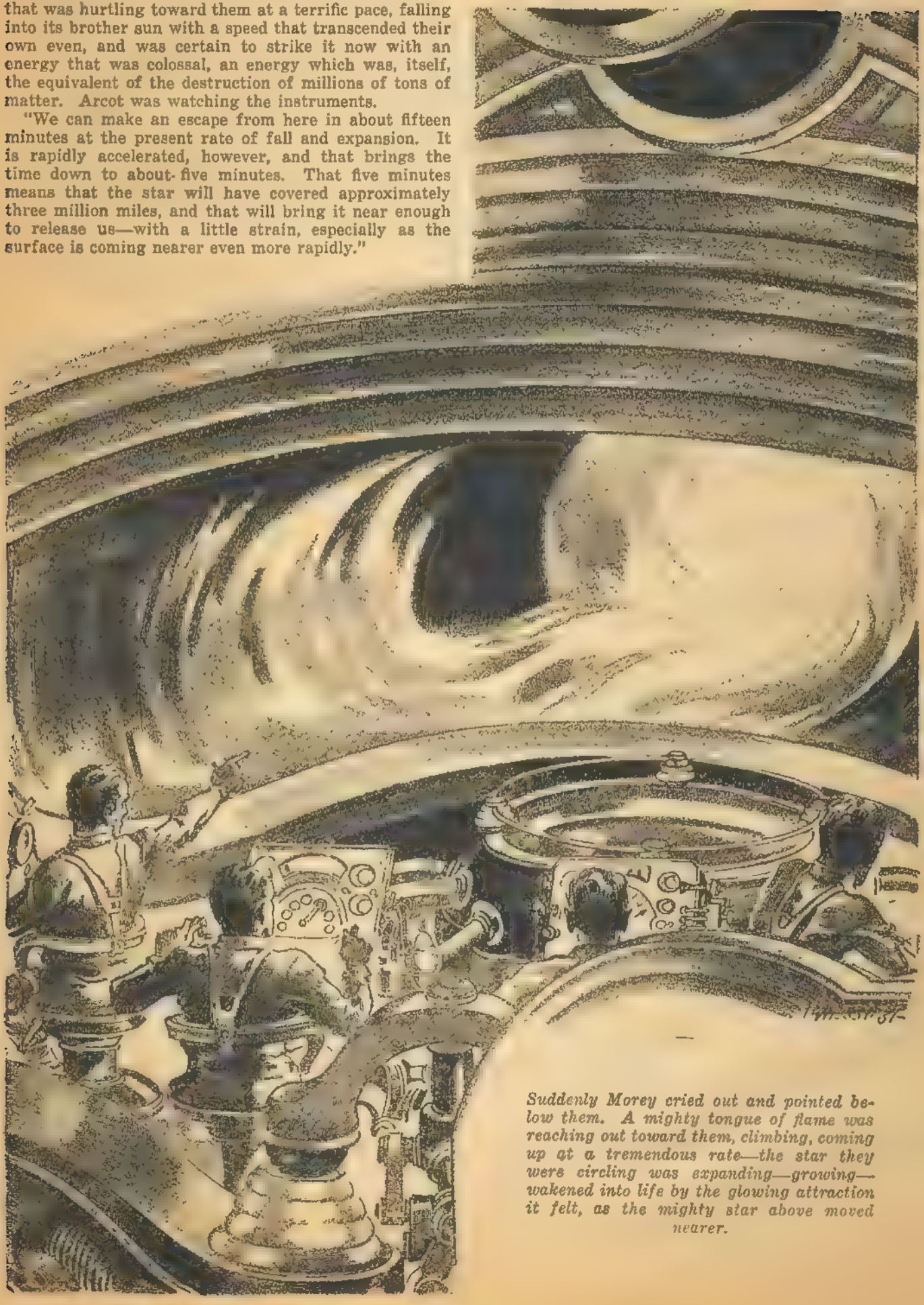
"We will have to put up the relux screens to turn the radiation when it gets too intense, and then we can only go by our instruments and calculations. We certainly didn't figure on this rate of expansion. We will have to try to escape in three and a half hours instead of six—this star is growing, as well as falling. Look—it is a disc of violet now—and ultra-violet at that, I'll bet—it is as big as the full moon—and it is still growing!"

In awed wonder the men watched the titanic sun, a mighty hurtling mass of seething flame, grow before their eyes. It changed its color till it was shining a violet that was injurious to the eyes, and they wore glasses which cut out the ultra-violets, and left only the harmless rays. It was already the size of our sun's disc, and due to its far higher temperature, was radiating far more heat. It was only their greater distance that made it possible to stand it. The heat was indeed mounting, although the perfect reflecting of the relux turned all away that struck the sides. It could enter only at the windows. But all windows were closed, save those of the pilot room. They no longer needed the observatory. Their pale primary, the star about which they revolved, now glowed brighter. It was reflecting the light of its fast burning brother! The temperature was already 35,000 degrees on the surface, Arcot calculated, and it was mounting rapidly. They were feeling the effects of the gravity now, and their orbit was straightening out. About them already, Arcot saw that the far-reaching tongues of flame were blazing.

"We can even live through one of those tongues of flame, thank the Lord! Lux metal doesn't melt at 40,000 degrees, as we have found, and though it will then be radiating a terrific amount of heat, if all our windows are covered with relux, and the inner wall is relux, of course we will be able to live through that; the lux metal is a perfect, or very nearly perfect, nonconductor of heat, so the relux inner wall will not be heated except in small spots, and there we can cool it with a molecular ray. The vacuum is as perfect as the vacuum of space, and we will be protected—but we can't *stay* in that flame!"

The reflux shields were half across the control room windows now, and they saw only a giant disc of flame that was hurtling toward them at a terrific pace, falling into its brother sun with a speed that transcended their own even, and was certain to strike it now with an energy that was colossal, an energy which was, itself, the equivalent of the destruction of millions of tons of matter. Arcot was watching the instruments.

"We can make an escape from here in about fifteen minutes at the present rate of fall and expansion. It is rapidly accelerated, however, and that brings the time down to about five minutes. That five minutes means that the star will have covered approximately three million miles, and that will bring it near enough to release us—with a little strain, especially as the surface is coming nearer even more rapidly."



Suddenly Morey cried out and pointed below them. A mighty tongue of flame was reaching out toward them, climbing, coming up at a tremendous rate—the star they were circling was expanding—growing—wakened into life by the glowing attraction it felt, as the mighty star above moved nearer.

Arcot was gazing out now, through smoked glasses, at the mighty mass of flame, its titanic shooting flames stretching out a million and half miles from its seething surface. In a brief three hours the star had changed from a dormant star, to a roaring, struggling giant, straining at the long-held bonds of atomic separation. Now, as the atoms reformed, they were instanly blasted into radiation, but as the temperature rose, the atoms were once more driven into quanta, and the radiation could not take place; it was the swift expansion which, cooling the star, permitted this continued radiation and the rapid growth.

Suddenly Morey cried out and pointed below them. A mighty tongue of flame was reaching out toward them —climbing, coming up at a tremendous rate—the star they were circling was expanding—growing—wakened into life by the growing attraction it felt, as the mighty star above moved nearer.

"The sun we are circling is expanding—we are going to get caught in it! We have to try now—or never!" cried Morey.

The close drawn slit that had been admitting what little light they had allowed, was now covered by a flashing sea of flame—the mighty disc of the star that was falling at close to sixty thousand miles a second!

SUDDENLY there came across the view an instantaneous sweep of flame—the ship was suddenly thrown end over end as it rocked under the blast of flame that welled out of the awakened and expanding star—it was racing out at close to three hundred miles a second, a flaming tongue of hydrogen and helium. At a temperature of ten thousand degrees, the lux metal coating withstood it, unharmed, but the men inside could feel the mechanical force of the blast of gas.

Wildly, Arcot struggled to right the ship, get it into a position pointing toward the rapidly narrowing space between the two stars. They must be headed thus if they wished to get free. Only a small jagged space of black showed in the slit of the relux screens—the heaving ship was unmanageable. Now, as the flame receded, they righted the ship for an instant, and Arcot threw the space control apparatus in at full force.

Space rocked wildly, the air around them was a sudden inferno of sparks and they were suddenly in peaceful dark—then there was a wave of sinking, staggering force; they seemed sinking in interminable night —it was dark—dark—dark——.

Hours later Arcot regained consciousness. It was quiet in the ship. He was still seated in the control room, strapped in his seat. The relux screens were in place, and all was perfectly peaceful. As yet he had no means of telling that they were standing still, or racing through space at a speed greater than light, save by his instruments, and his first semi-conscious impulse was to look and see.

He reached with an arm that seemed to be made of dry dust, ready to crumble, an arm that would not behave. His nerves seemed jumping wildly—at last he pulled the switch he was seeking, and the relux screens dropped down as the motors pulled them back. . . They were in space, flying in hyperspace, and beside them rode the twin ghost ships. Arcot looked about him, trying to decide what to do, but his brain was clogged. He felt tired. He wanted sleep. Scarcely able to think, except that the others, too, might be tired, he dragged them to their rooms, and strapped them in their bunks. Then he strapped himself in, and fell asleep almost at once. But this was a natural sleep.

One by one the others woke from their strange unconsciousness and found themselves in their bunks. They were sleepy—tired. They stayed there. Arcot woke slowly to insistent shaking by Morey.

"Hey—wake up—ARCOT!" His ears sent their message to the brain, but the brain tried to disregard it. At last he slowly opened his eyes.

"Huh?" he said in a low, tired voice.

"Thank the Lord! I didn't know whether you were alive or not. None of us remembered going to bed, and for that matter we didn't remember anything. We decided you had carried us there, but you sure looked dead!"

"Uhuh?" was Arcot's unenthusiastic rejoinder.

"Boy—you are sleepy!" laughed Wade, as he drifted around the corner of the door. "Here—give him a little cold water, Morey!"

A brisk application of cold water restored Arcot to more nearly a waking state. He immediately clamored for the wherewithal to fill an aching void that was making its presence painfully evident within him.

"He's all right!" laughed Wade. "He seems to have just as healthy an appetite as ever."

They had already prepared a meal, and Arcot was promptly hustled to the galley, where explanations were started.

He had no recollection of taking them to their bunks, but he did remember looking out the window. He had not stopped the ship, and wanted to know where they were.

"That," replied Morey seriously, "was just what we wanted to ask you. We haven't the beginnings of an idea. We slept for two days, all told, and the result is that we are far enough from all the Island Universes, not to be able to tell one from the other. Furthermore, as we seem to have left at a tangent, we have come further from our own than from any other. We have no idea where we are. I have stopped the ship, and we are just resting on the meteor protector. I am sure I don't know what happened, but I think you may have an idea."

"I have an idea—I'm hungry. You wait till I have eaten, and developed a theory and I'll talk with you," said Arcot, falling to on the food.

AFTER eating, he went to the control room, and found that every gyroscope in the ship had been thrown all out of place by the attractions they had passed through. It was obvious what had happened, mechanically. Their attempt to escape had been successful; they had shot out from between the stars, out into space. The energy had been drained from the power-coil as they went, as had been expected, and then the power-plant, had at once started charging them again, and in two hours they had been charged, and the ship had automatically flashed on. The stars, which they had crashed together, were now millions of millions of light years behind, and they had no idea where their direction lead. They were lost in space!

"Well, there are a lot of universes we can go to; we ought to be able to find a nice one and stay there, if we can't get home again," said Arcot, smiling.

"Yes, only it so happens I have a hankering for home. What suggestions have you to make, and what happened to us, that we all passed out like so many lights?"

"I am sure I don't know; my only theory is that the gravitational field had some effect on our field that produced a sort of cross-product that affected our brains, rather deleteriously. At any rate, here we are."

"Yes, but I am particularly interested in getting away from here, and not at all interested in staying here. How can we identify our Universe? Can we back trail, and reach that one we just left?" asked Wade.

"Not a chance," began Morey, "we were spun all

around those stars, and we were headed off in a new direction. We are now bound for some place, but we didn't come in a straight line. Furthermore, it isn't straight, for one of the gyroscopes was jammed I see, and the machine has been processing about that one ever since, and the chances are that we are now moving in a circle, a big one—but then, when we were moving at the rate we were—— We can't back trail.

"Now as to identifying our own Universe. What characteristic features has it? The first thought is constellations, but we cross that out right off. First, we are too far away. Second, we may be on the other side of the plate now, and not recognize it.

"The second thing—and this is no doubt our only bet, is that our universe is, by far the largest in this part of space.

"If we spent, say ten years of careful study and photographing, we might find it. We know that system will locate the Universe, but we haven't the time.

"Well, we came out to visit planets; here's our chance—and our only chance of getting home, so far as I can see. We can go to any Universe in the near neighborhood—I mean within say fifty million light years, and ask the inhabitants of any planet we may find with a high degree of development, which is the largest Island Universe in their heavens—and keep trying till we find a people who have learned through their research. I think that is the quickest, easiest, and most satisfactory method. What say you?"

That was the obvious choice, and was agreed on at once, by all. The next proposition was the job of selecting a Universe.

"We can go to any one we wish, and as we are now traveling 30,000 miles per second, it would take us a long, long time to slow down, and almost as long to turn the ship around. Now, there is a nice big Universe in front of us, why not head right for it? I think it is about three days away—that is about six million light years. Any objections to going to it?" said Morey, pointing to the glowing point that was the Nebula. Out in space a star is a hard, brilliant point, a shining, dimensionless point, that shines brightly and with a faint color, and they are always seemingly "hard." That is the impression one gets, but a nebula glows with a faint mistiness; they are so far away that they never have any bright glow, such as stars have, but they are so vast, their dimensions are so great, that even in the vastness of intergalactic space, they have dimension. Even then they have a slight breadth, and appear as tiny glowing discs—discs whose edges are faint, indistinct. As they looked out through the clear lux metal windows, they saw the tiny blur of light on the soft black curtain of space.

It was as good a course as any, and inertia commended it, so they merely redirected the ship with greater accuracy. Setting the damaged gyroscope, however, came first. There were a number of things about the ship that needed readjustment and replacement, after that terrific strain.

"I wonder if it wouldn't be wisest to make all readjustments, and to see that everything is working perfectly before we go to any new worlds, instead of landing there first, and then finding that we have no microphone outside, or that the ray projectors aren't working. It would be inconvenient, to say the least, and the chances are always fifty-fifty, if not nearer ninety-nine-one that the visited peoples will not welcome us with open arms, but with open cannon muzzles. I am certain that the outside microphone is gone, and that the ray projectors are in bad shape. Also, the outside loud-speaker unit is gone. Since we used relux connectors, the leads won't be fused off, at any rate.

"I can think of a number of things that might well be done. I think we had best get into our suits and get out and fix them now. We could do it on the planet—and more readily—but there might not be friends to help us," said Arcot.

The work inside was left to Arcot and Fuller, while Morey and Wade took a number of tools of various sorts, and all the spare parts they expected to need down to the airlock, and then returned, donned their suits, and stepped out into space, from the airlock.

They found even less damage than they had expected. True, the loud-speaker, the microphone, and all other instruments made of ordinary matter had been utterly removed. They did not even have to clean out the spaces where they had been recessed into the wall—the metal of the wall had been raised to a temperature of approximately 10,000 degrees, and the metals had all boiled away, leaving it quite clean. There was no coating on the walls of the car, as might have been expected, for while at that terrific temperature, no matter could condense on it. It was like a piece of red hot iron—water will not condense on it, and if it be held in a stream of water, as long as it is hot, no water condenses, and when pulled out, still hot, it remains clean. And since even tungsten boils away at 7,000 degrees, and all other substances known boiled more easily, there was no fear of trouble.

The ray projectors, which had been readjusted for the greater power, when used to move the sun into its new orbit, were adjusted for the normal power, while the cosmic ray apparatus was fixed. The lead supply had all been boiled away.

The name of the ship had been put on in raised letters, painted with a colloid suspension of gold in a special liquid which, evaporating away, left the gold in the solid yellow state on the metal so plated. Since lux metal was a non-conductor, and absolutely inactive chemically, it was impossible to plate it effectively in any other way. However, this had been thoroughly removed with the rest of the matter, and they were trying to decide how one painted a thing at absolute zero. Anything they put on would instantly freeze, when Arcot, hearing their problem, *via* the radio, suggested that they use a red paint, one of the evaporating solute type, and preheat the metal to be painted.

The problem was solved!

AFTER nearly four hours' work, everything had been checked, from relays and switch points, to the instruments and the gyroscopes. Stock had been taken, furthermore, and it was decided that if they got into very much more trouble, they would have to stop using some of the machinery, and break it up for spare parts. It was certainly lucky they had come away with plenty of spare parts! They had remaining, of their original store of twenty tons of lead, only ten tons. This they could easily replenish at whatever planet they might stop on. They could also get a fresh supply of water and refill their oxygen tanks and nitrogen tanks there.

The ship was in as perfect condition as it ever was for now every bearing had been put in condition and the generators and gyroscopes were running smoothly.

They threw the ship into full speed. Morey engaged Wade in a fierce battle of chess, with Fuller as an interested spectator. Arcot, too, was watching, but he said nothing.

"Now why did I make that move?" said Morey suddenly. "I intended moving my queen over there to check your king on the red diagonal."

"Yes," replied Wade, "that was what I wanted you to do," he added gloomily. "I had a sure checkmate in three moves."

Arcot smiled, but said nothing. They continued the play for several moves, then it was Wade that remarked that something seemed to be influencing his playing. He had intended trading queens. He didn't, but suddenly he discovered that he was in a better position. That was all.

"That was a good move for you," said Morey. "I was due to clean up on the queen trade, and you surprised me by making that move, because that is not your usual type of play. You usually go in for trades. It beats me."

It did. In ten moves, ten moves of perfect playing to which of every attack Morey launched with the white, red saw the weak point, and the attack crumbled disastrously; white was forced to resign, his knight in a hopeless position.

"You know, Morey, I seemed to know exactly why you made every move, and saw every possibility of it."

"Yes, so I noticed!" said Morey with a grin.

"Come on, Morey, let's try it," said Fuller, sliding toward the chess table. The chess game was possible by using a standard lightweight set, each piece of which had a small magnet in it, and the board was of iron.

Again Morey went down to disastrous defeat. Yet ordinarily he was very equally matched with Fuller. It almost seemed as if Fuller could read his every move.

"I certainly am all off form today," he said, rising from the table. "Come on Arcot—let's see you try Wade."

Arcot complied, and although he had never played chess as extensively as the others, he proceeded to clean Wade out, lock, stock and barrel.

"Now, what's come over you?" asked Morey in astonishment, as he saw a very complicated formation working out, a formation he knew was far better than Arcot's usual game, and one which he himself had just conceived, and felt very, proud of.

Arcot looked at him and smiled. "That's the answer, Morey!" he said.

"What—what's the answer to what?"

"Yes—I meant it—don't be so surprised—you have seen it done before. I have. No, not under him, but under a more experienced teacher. You see, this will be very handy in our litle explorations." Morey's face showed more and more astonishment as Arcot's strange monologue continued. He hinted more and more broadly. He turned to Wade, who was looking at him and at Morey in wide-eyed wonder.

"You did!" said Wade in a surprised voice. "When?" A pause followed, in which Arcot stared directly at Wade with an intensity that began to tell Fuller what was happening.

"Well, if you have learned the stunt so thoroughly, try it out. Let's see you project your thoughts. I can believe you can read them—no wonder we couldn't win at chess!"

Arcot burst out laughing. "I have been projecting my thoughts to you—ask Fuller here if I said anything."

"I'll say, he didn't!" replied Fuller, smiling at the surprise on Wade's face. "He said so little, I am quite in the dark as to how, when, and where he learned the secret, though I can easily guess that he has picked up telepathy as one of his accomplishments. We certainly had a fine chance to play chess, with him around here!"

"I spent three months on Venus a while back, studying with one of their foremost telepathists, and along with some other Terrestrians, learned how to do it. The whole secret is that we have the power, each one of us, and all animals of the most moderate brain power have it. In the animals, however, it is better developed, for they need it, while man found that language, aside from communicating at a greater distance, would give his thoughts more concreteness, and hence permitted a freer and more clearly conceived type of thinking. The result was that his telepathy fell into disuse, and idled, and like all disused things, atrophied. It gives one terrific headaches for the first three days or so, and it's bad enough for weeks after, but you get used to it in time. I can use it for about three hours at a stretch without killing myself mentally. I will have to stop soon. I was rather mussing up those chess games of yours by reading Morey's mind, and projecting the thoughts into Wade's thinking mechanism. I can make you 'hear,' or you can conceive the idea as though it were your own, depending on my method of projection.

"I am going to try to show you how to read, which is the easier of the two, and then I will try to teach you how to project your thoughts. It will be invaluable when we visit another planet. No language is needed." He turned to the others, and told them carefully the principles on which the Venerian system of telepathy was based. The system that had so surprised them on the occasion of their first visit to that planet, was not so extremely complicated at that, they found, and within an hour and a half, they could read the ideas that the others were picturing. It was impossible, as yet, to grasp complicated ideas, unless Arcot projected them a bit, but such picture-ideas as *book* or *knight* were easy to receive. They practiced steadily for about an hour, when Arcot warned them that if they didn't stop, they would develop headaches, which would make them need some kind of an opiate. They soon decided that he was right, and stopped. However, they read some of the books Arcot had brought along on the ship, and tried to make up for lost time.

"Why didn't you start showing us sooner?" asked Morey, reproachfully.

"Why, I wanted to have some mental privacy. Also, I wanted to have some time to get acquainted with things on the ship—and also, I just didn't feel like it. It's a whale of a lot of work to do that stunt, and I was doubtful of my ability as a teacher. I'm going to sleep awhile now."

The time passed rather more rapidly now, as they spent a considerable part of it reading books on telepathy, or practicing it. By the end of the second day of their trip, Morey and Fuller, who had a peculiarly adaptable mind, were able to converse readily and rapidly, Fuller doing the projecting, Morey the receiving. However, it was necessary to develop some sort of system, for as yet they could transmit their ideas only in pictures. Wade had divided his time about equally between projecting and reading, with the result that he could do neither well.

On the morning of the fourth day after leaving the field of the giant star, they entered the Universe for which they were heading. At least it was about eighty-five hours later, and they had all risen very recently from a long refreshing nap.

They had stopped at a distance of about half a million light years, and decided that a large local cluster of very brilliant suns promised best results, as the stars were closer together there, and further, there seemed to be many of the yellow type they wanted. The closer stars, of course, gave reason to hope that passings, which might produce planets, had taken place. The nearer they were together, the more apt to pass within a few millions of miles.

They had penetrated into the Universe as far as was safe, using the half speed; then at lower speeds, they had worked toward the local cluster.

"Well," said Arcot, piloting the ship. "We are where

we wanted to be, now what do we do. Morey, your job is to pick the nearest G-O star. Come on—we await your royal command to move!"

"Well," said Morey, returning from the control room a few minutes later, "all stars of type G-O are approximately the same size, that is in mass; they must be within a few per cent. of the same mass, or they will be outside the limits of the 3.54 to 4.88 magnitudes. At any rate, I see one there that is of magnitude 3.7 or so, which makes it a very brilliant type G-O star, and I think that will give us as good a chance as any. What say we go?"

"Suits us—where is it?"

"I will have to direct the ship; I'll let you pilot it. I know I can work the instruments, and so can the others here, and we can work the ray projectors. But I never succeed in hitting anything with the rays, and you never hit anything with the car, so we'll let you take it." Morey and Arcot were the better pilots, although each of the men could maneuver the ship very well. Since Wade and Fuller shone as ray operators, this position was given to them.

MOREY swung the ship about now, pointing the axis of he ship in the same direction as its line of flight. The observatory had been leading, but now the ship was reversed till it was in normal position; then, they started once more, decreasing their terrific speed somewhat. When they were perfectly directed, and the distance calculated, Arcot threw the ship into one-quarter power, and they shot forward. An hour later they stopped. Already the disc of the sun was large before them, and they would have considerable difficulty slowing down to orbital speed. The speed was so high that the attraction of the sun did not seem to swerve them greatly as they rushed nearer. Morey was busy with the telectroscope, although greatly hampered by the fact that it was a feat of strength to hold one's arm out at right angles to the body for ten seconds under the heavy acceleration Arcot was using.

"This system works!" called Morey suddenly. "We have picked another winner! I can make out a planet, I am sure, a fairly large one, too. It is smaller than Earth, I think, but I can't tell. Circle the sun, in an orbit, and we can come back to it."

Arcot was already trying vainly to decrease their velocity to a figure that would permit the attraction of the sun to hold them in its grip and allow them to land on a planet.

"As I figure it, we will need somewhere in the neighborhood of 100 days to come to rest, using all the negative acceleration that will be safe. At five gravities, to reduce our present velocity of 25,000 miles per second to zero, will require, approximately 2,400 hours, 100 days. I think the only way we can do it, is to make that sun pull us to rest."

"We will have to use the space control. If we move close to the sun, by the space control, all the energy of fall will be used in overcoming the space control coil field, and thus prevent our falling. When we start to move away again, we will be climbing against that gravity, and we will have a gravity many times greater to aid us in stopping. It will, nevertheless, take us about three days to stop. I am going to start the first cycle now. We won't get anywhere using only our own power. That sun back there was too blamed generous with his energy of fall!" said Arcot, smiling.

They started the cycles, and as Arcot predicted, they took a full three days of constant slowing to accomplish their purpose, and burned up nearly three tons of matter. They were constantly oppressed by a load of five gravities, save the short intervals when they were moving in the space control field, and the intervals when they stopped to eat. Even in sleeping, they were forced to stand the load. The massive sun was their principal and most effective brake. At no time did they go more than a few dozen million miles from the sun, for the more intense the gravity, the better effect they got.

Morey divided his time between piloting the car while Arcot rested, observing and sleeping. By the end of the third day, he had made very creditable progress with his map of this solar system.

He had located only six planets, but he was certain that there were others. For his purposes he had assumed circular orbits, and calculated their approximate speed of motion from the distance from the sun, and the mass of the sun, as determined by direct weighings aboard their ship. Taken at various points in their fall, it was easy to calculate from the older Newton formula the mass of the sun. He soon had a fair map of the system constructed mathematically. This he tested experimentally and found true to a very close approximation.

The planets, from the order of their masses, rather indicated a more extensive system than those of old Sol.

The innermost planet was slightly larger than Mercury, being 4200 miles in diameter, and revolving at approximately 40,000,000 miles from the primary. The next, which Morey had named after the planet of the solar system, using the Greek name for the corresponding divinity, Aphrodite, was approximately 8000 miles in diameter. It revolved at a distance of 75,000,000 miles, and, like its solar counterpart, was cloud wrapped most of the time.

The next, Terra, as Morey had called it, was indeed much like the Earth. At a distance of 124,000,000 miles from its sun, it must have received almost the same amount of heat that Earth does, for this sun was considerably brighter. It was 8200 miles in diameter, a shining sphere, and because of its relations with the rest of this system, Morey had observed it more carefully, which was the main reason for his knowing the distance from the sun a bit more accurately. At first it had been only this interest, but since it apparently had a clear atmosphere, he soon found that he had every reason to be interested. It must be inhabited. He felt certain of this, but his photographs were consistently poor, and he had no very good evidence, as they had not come within fifty million miles of the planet as yet. Arcot was swinging the ship about, however, and as the speed finally dropped to a more manageable rate, they headed for it.

The other planets had proven of little interest. In our system, Mars had, like the planet that once formed the mass from which the asteroids are derived, been broken up, as, like the mythological Icarus, it flew too close to the sun. Originally larger than Earth, it was smaller through all the time of Man.

So this next outer planet had been broken up, and there were now two bands of asteroids, one just beyond Terra, and another just beyond the fourth major planet, a giant 50,000 miles in diameter, named in honor of the corresponding solar planet, Zeus.

OTHER planets had not been found. But the inner two, Aphrodite and Terra, were of far more interest, in any case.

"Well, I think we picked the right angle to come to this system," said Arcot, looking at Morey's photographs of the wide bands of asteroids. They had come at an angle perpendicular to the planetary plane, with the result that, instead of having to pass through the planetary asteroids, they had been millions of miles from them at all times.

"We did, but why not land?" asked Morey, pointing to the speedometer, which now read well below 1000.

They started now, toward the planet Terra, and to facilitate moving, they used a touch of space power, reaching the planet in less than three hours.

The globe beneath them now was lit brightly, for they had approached from the daylight side. There were wide, green plains, and gently rolling mountains beneath them, and in a great cleft in one of the mountain ranges was a shimmering spot of clearest blue.

The air of the planet was rushing about them now, as they dropped slowly down, and the roar in the loud speaker was growing to a mighty cataract of sound. Morey turned down the volume.

The sparkling little lake passed beneath them as they shot on, still at a height of seventy-five miles. They could see the horizons about them now, as though they looked down on some giant inverted bowl, the edge resting on a vast, smooth table of the deepest violet, a violet that was constantly changing to a bluer and bluer shade. Suddenly they experienced that strange optical illusion of the "flopping" of the scene. It turned beneath them. Mysteriously they were gazing down into the bowl, instead of on its inverted surface, and what had been the outside was now the inside.

They had passed the mountain range by this time, and the vast plain was spread out before them. Here and there, in the far distance, they could make out slight darkenings. The darkened spots were doubtless geological strata.

Arcot swung the ship about, and they saw the vast horizon swinging about them, as their sense of "down" changed with the changing acceleration of the turn. They felt nearly weightless, revolving about the world at a speed of five miles per second, or very nearly orbital speed.

Arcot was heading back toward the mountains they had passed over. The green of the foothills was already rising to meet them. They had nearly come to rest in the lateral sense, moving at little more than five hundred miles an hour, and falling at the rate of twenty-five miles an hour. Still, at the present rate they would require three hours to reach the green surface that seemed so pleasant.

"I am heading for that lake. It seems absolutely deserted, and there are several things I want. I haven't had any decent exercise, save lifting my own heavy body around, for the last two weeks. I want some swimming, and I also intend to distill some water for drinking. I know it will be flat, but a pinch of salt, a little calcium salt and a few other flavorings, and it will be all right. Then we can fill the water tanks for emergencies. We can also fill the oxygen tanks from the water by electrolysis. If the air contains enough nitrogen to make it worth while, we can freeze some of that out, and store it in the air-tanks of the ship, using the molecular cooler, of course. In fact, we might have one of those good old-fashioned 'picnics' and throw a sun bath into it. I have been wanting a real sun bath for some time. Those blamed ultra-violet generators are all very well—but they aren't as satisfying!"

No one seemed to have the least objection! They had slowed the ship to a halt as she hung high over the little, gleaming lake. Now Arcot dropped the shining hull a sheer fifty miles, at a speed of about 500 miles an hour. Wade, as chemist of the expedition, was delegated to test the atmosphere.

In the meantime, the others collected the apparatus they intended to take with them. A long hose was coiled up and connected to the water distilling apparatus, the pump there being capable of pulling the water of the lake in directly. The air apparatus would merely suck air through a tube.

By the time they had returned with the last load of the apparatus they intended using, everything from thermometers to pans and ray pistols, both cosmic and molecular, Wade returned with his report.

"The air pressure is 20.3 pounds per square inch. Temperature is about 95, due to thicker air envelope holding heat better, probably. The composition is: oxygen, 18 per cent, nitrogen 75 per cent, carbon dioxide 0.4 per cent, the rest is utterly inactive. I can't touch it with titanium, so it isn't nitrogen. Sodium won't affect it, so it isn't oxygen. Flourine won't do anything, so it's not metallic in nature. I suspect that it is an inert gas. It certainly isn't poisonous, if it's so inert! There is a large amount of water vapor, but due to the higher pressure, there is less than I would expect on Earth at the same temperature. I put a canary into the air, as usual, and found the bird liked it, so I suspect it is quite safe—except for possible germs. Of course, my pressure reading of 20.3 pounds per square inch is extrapolated from the height of that atmosphere and the density of the air so far.

Here, at a height of 25 miles, the air is naturally germ free.

"I am depending on the fact that in general the chances of organisms developing along exactly the same line are very slim. We may find the inhabitants of the same shape as men of another world. I expect that the men of other worlds are using the wheel. It is a good piece of mechanism. The human body is well constructed mechanically. The head is in a place where it will be able to see over a wide area—and be so much the safer. The hand is very useful, and can be improved on but little. True, the Venerians have a second thumb on each hand, but the principle is still the same. The backbone is such a fine piece of mechanism—it is certain to develop on any world.

"On Venus, although the men were almost exactly like us outwardly, they were so widely different chemically, that we are probably quite immune to their diseases. We need no immunity—we can't expect germs that attack our bodies to attack a snake; the chemical difference is too great. Similarly we can't expect a germ which attacks a Venerian to attack any Earthly creature. I am sure the same holds true here.

"However, I am sure that a Terranian lion or tiger would find us quite as edible as would an Earthly lion. Hence the weapons. Also—we might not be welcome."

They sank the machine swiftly, till they were hovering a bare 100 feet above the little mountain lake. There was a little stream winding its tortuous way down the mountainside, feeding it, while another led the clear overflow away.

"I don't think there is anything of any great size in that lake," said Arcot slowly and thoughtfully. "Still, a small fish might be deadly—let's play safe and remove all forms of life, bacterial and otherwise. A little touch of the ray, greatly diffused, will do that.

"Wade, you do it; I'll hold the ship directly over the center of the lake."

The molecular ray, since it directed the molecules of matter, would prevent chemical action from taking place when very greatly diffused, for then it made the molecules go all the same direction, only to such an extent, that the delicate balance of chemical reactions that is life, is upset. It is too delicate a thing to stand any power that will alter the rate of reaction. All things are killed instantly.

As the light haze of the ionized air below them glowed out in a huge cone, the water of the lake heaved slightly and seemed to move to its depths, but there was no great movement of the waters; they lost only a fraction of their weight. But all living things in that water died instantly.

ARCOT turned the ship, and the shining hull glided softly over to one side of the lake where a little sandy beach invited them. There seemed no indication of man about.

Each of them took a load of the supplies they had brought, and carried them out under the shade of an immense pine-like tree, a gigantic column of wood, that stretched far into the sky to lose its green leaves in a waving sea of foliage. The mottled sunlight of the bright star above them made them feel very much at home. Its color, its intensity, its warmth, all were exactly as of Earth.

Each was wearing his power-suit now, to aid in carrying the things they had brought, for on this more massive world the gravity alone was different. The air pressure was so little greater that they scarcely noticed it. Even the interior of their ship had been adjusted to this pressure. They had every intention of staying here for a while. It was pleasant to lie in the warm sun once more; it was hard to remember that they were countless trillions of long miles from their own home planet. It was hard to realize that that warm, blazing sun was not their old, hot sun.

Arcot was carrying a load of food in a box. He had neutralized his weight till, load and all, he weighed about 100 pounds. This was necessary, in order to permit him to drag the hose behind him. He was leading this down to the water. He pulled his hose as far as the beach, then deposited the box, and set to work in earnest, tugging the hose into place. He tried to float it out over the water, but finally had to be content with getting it but a few feet from the shore.

Morey almost had an accident. He had been carrying a load of about thirty pounds of assorted things to use. He had a number of pneumatic pillows, a heavy iron pot for boiling the water, and a number of other things.

He reached his destination, having floated the hundred feet or so from the ship, pulling himself along with the molecular motion power unit. He forgot, momentarily, and released his load, which dropped down, while he, equally promptly "dropped." He had a buoyancy of 300 pounds, perhaps, and a weight of 250 pounds. Further, in dropping his load, the sudden release had caused the power unit to yank him up straight, and somehow the controlling dial of the power-pack had been torn loose. Result: Morey was in the air, and showing a fair rate of progress toward his late abode, space, and had no available means of stopping it. His hand power unit was far too weak to overcome the pull of the power-pack, and he was rising faster and faster! He realized that his friends could easily catch him—and laughingly he called down.

"Arcot—help—I'm being captured by my power suit! To the rescue!"

Arcot looked up quickly at Morey's call and realized immediately that Morey's power control must have come off.

"Good-bye. I have been trying to think of a good method to lose you before we had to meet some people. I didn't want them to meet such a weak-minded specimen of humanity. Tell me if you get cold before you fall into the sun!" Whereupon Arcot turned back to his work.

He realized also that there were twenty-five miles of breathable air above, and long before Morey rose that far, he could catch him in the *Ancient Mariner*, if necessary.

As a matter of fact he let him go to a considerable height before he reduced his weight to something less than zero, using a lift of about 100 pounds. Quickly he gathered speed that shot him up toward Wade very swiftly, and a moment later he had caught up with him and passed him. Then he shut off his power, coming to a halt, with a weight of about 200 pounds. Swiftly now Morey rose to him, and again Arcot turned on some power, till Morey was just drifting toward him slowly, although he was rising at a speed of nearly fifty miles an hour. Arcot grasped Morey's leg and turned his power down till he had a weight of fifty pounds. Soon they were both falling again, and when their fall had amounted to a rate of approximately twenty miles an hour, Arcot made their combined weights zero, and merely continued down by their momentum. Just short of the ground he leapt free of Morey, and Morey, carried on by mere momentum, soon followed. Arcot at once jumped in and held him down.

"Now, now—calm yourself. Don't go up in the air like that over the least little thing!" said Wade solicitously.

"I won't, if you'll get busy and take this darned thing off, or fasten some lead on my feet," replied Morey, starting to unstrap the mechanism.

"You had better held your horse there," said Arcot, "for if you take that off now, we sure will need the *Ancient Mariner* to catch up with it. It will produce an acceleration that no man could ever stand—somewhere around the order of 5000 gravities—if the tubes will stand it. And as that one is equipped with the invisibility apparatus, as the regular ones are not, you will be out one good invisibility suit. Now, if you can restrain your impatience, I will get a new control dial and shut that off. Hey, Wade, get the boy a rock to hold fast to. Better tie it around his neck so he won't forget it and fly off into space again. It's a heck of a nuisance locating so small an object in space, and I promised his father to bring back his body, if there was anything left of it," remarked Arcot nonchalantly, releasing Morey, as Wade handed him a large stone. A few minutes later he returned with the adjustment dial, and affixed it to Morey's apparatus. In a moment the strain was released, and Morey parted with the rock, evincing every manifestation of joy.

"The dumbness of some people's grandchildren!" remarked Wade in deep surprise. "And here I always credited him with sense. He pulls his apparatus apart, then starts up into space. I can think of easier ways to commit suicide!" He shook his head dubiously and turned back to his work of frying some very deliciously odorous bacon. Over another small heater a coffee pot was sending out odors of equally enticing quality.

"Forget it, Wade—and get that food ready," suggested Fuller, sagely, from his position in the bright, warm sunshine. He was already in short trunks, lying with his back exposed to the sunshine. The curve of the muscles showed his complete relaxation. He was enjoying life. Arcot was gone—putting on his trunks also.

"Hmm—wise advice from one who doesn't work. Come on and help!"

"I'll help you now, if you will help me with the dishes," said Fuller, without the slightest sign of movement in his direction.

"Fuller, I think, has the right idea. I'm going to emulate his excellent example!" said Morey, looking at Fuller's perfect comfort with a judicious eye.

"Which makes three in favor—and the fourth on his way," said Arcot, as he came out of the ship and sank down on the soft sand of the beach.

THE lunch was a great success, and all thanks were voted to Wade. While he was getting ready for his sun bath, the others carried the now unnecessary apparatus back to the ship.

One of them, however, was to stand guard, while the others were in swimming. Standing guard consisted of lying on his back, on the soft sand, and staring at the

delightful contrast of lush green foliage and deep blue sky. They waited a time after lunch before swimming, lest cramps attack them. Then, for nearly an hour, they enjoyed themselves in the rather warm water.

"Ah, I feel better," said Arcot after they had finished the swim. They were basking in the sun, side by side.

"Say, they must have a long day here," said Wade. "That sun has not moved more than five degrees in the two hours we have been here."

"As a matter of fact," replied Morey, not bothering to look at the height of the star, "it should have moved exactly nine degrees. The day is twenty hours, and twenty hours of night follow. If they didn't have such a deep atmosphere, it would get kind of chilly here by dawn. But why talk about that, I want to rest."

"Well, we want to see you and Wade settle the long standing dispute as to wrestling ability," said Arcot. Both men were powerful wrestlers, although Morey was at a slight disadvantage in weight, for although he was two inches taller than Wade, he was not as heavily built. The long, smooth muscles under his skin testified to his speed, however, as well as to the fact that he was not lacking in strength.

They had tried many times, and the score was practically even, for Morey's smooth, muscular speed overcame his handicap in weight, and in sheer power, for Wade's arms and shoulders were bulky with the heavy, bulging type of muscles, and his deep chest gave him the endurance to maintain his powerful chemical engines in action for long periods. Neither lacked in skill.

Arcot was hoping for an exhibition.

"He won't wrestle. He knows that the only reason he threw me last time was because of that new trick he learned from the Chinese valet he hired. I think that fellow must have been thrown out of China for robbing churches. He looks hard-boiled enough," said Wade, rolling over, and smiling up at the deep blue sky.

"I was just about to say that it's too blamed hot, and if you want to see some wrestling, wait till night, and I can guarantee a real exhibition." He did not know, himself, how true his words were to be!

"But just for that remark, I'm going to slap you down in that pond there!"

They rose and faced each other. Arcot and Fuller retired to the safety of the turf, leaving the soft, sandy beach to the contestants.

Suddenly Morey dived for a hold, halted himself suddenly, and then, as Wade swerved to avoid the rush, he was off balance an instant and Morey crashed into him. They were down, with Morey on top. Only for an instant, however. In a moment the battle was a flashing conglomerate of heterogeneous and mismated arms and legs.

For nearly a minute the flashing arms and legs worked violently, then Wade had a hold that quieted them, and slowed them to a steady strain. For perhaps ten seconds the men were struggling, panting in this new position, Morey under Wade's arms, but far from down.

"Uh—you weigh fifty pounds more here, you horse!" he growled. The larger planet made the men heavier.

"ACTION! WE WANT ACTION!" called Arcot, laughing.

"Well, come on out and try it yourself," retorted Wade, puffing heavily.

The action was resumed more violently. Suddenly there was an instant of swift movement, in which none but the actual combatants knew what happened, and then the twisted and intermingled forms separated, and Wade was almost down! Morey had a half nelson and crotch hold, and was lying heavily on his chest. On this world heavily meant more than heavily on Earth! Wade was straining to keep his shoulder off the ground, while Morey waited patiently, knowing that eventually muscle must tire, while gravity, which was working for him, was tireless. Morey was on the shoreward side of Wade, and the shore was scarcely two feet from them as they lay parallel to it. Wade was parallel to the shore. Morey, at right angles to Wade, was at right angles to the shore. Suddenly Wade heaved quickly and his arm was under Morey's body. He gave a sudden terrific pull—his powerful muscles knotted under the skin of his chest, and suddenly Morey was lifted above him and sent splashing into the lake! Now, Morey weighed 250 pounds or so on this world, and lifting him practically at arms' length, as Wade had done, was no mean feat. Further, as his ardor had been sufficiently cooled in the lake, he decided that he would concede the match to Wade. It was too hot to wrestle, anyway. If Arcot and Fuller doubted it, they were perfectly willing to referee a match between them! Arcot and Fuller professed a desire to swim instead.

They left the lake now, and gathering up their things, returned to the ship. They dried themselves by brisk rubbing, and after the swim and the sunbath and the rubbing, as Arcot said, they felt more rested than they had before they took their exercise. They had not been tired; they were merely restless before, and the physical exercise had made them far more comfortable.

THEY gathered again in the control room. Arcot had drawn in the hose, the water tanks were filled, the air, nitrogen, and oxygen tanks were equally full. They closed the airlock and were ready to start again. They rose into the air, and hung high above the mountain and the little sparkling lake that had furnished them the most, in fact the only, enjoyable adventure of the trip.

"That certainly is a nice place for a picnic," said Arcot. "We want to remember this place, and come again some time. It is probably not more than ten million light years from home."

"Yes, it is handy. But suppose we find out how to get home first. I think Morey said this place was inhabited. Let's go and see," suggested Wade.

"Excellent idea. I quite agree. Which way do we go, Morey?" asked Arcot.

"This lake must have an outlet into the sea. I noticed vast areas of water, so let's see if we can't follow it down to the sea. Most rivers of any size have a port on their deltas, or mouths, and a port in the old days meant a city. Also they are apt to mean a water supply when the fluid is as clear and clean as this lake."

"I thought of that but decided it was not a water supply, because we are at least two hundred miles from the nearest city. From our height we would have spotted any nearer city."

"Well, if you don't like my suggestions, make some of your own," grinned Morey.

"Oh, we'll follow the river, of course," replied Arcot. And so saying, he swung the shining ship about and headed smoothly down along the line of the little stream that had its beginning at the lake. Mile after mile of the wide plain rolled by beneath them, and far ahead there loomed a range of rolling hills, the green banks of their sides showing dark in the clear blue of the sky. Below them were vast stretches of deserted plain.

"I wonder if this place is inhabited? This land is not cultivated at all," said Arcot.

"No, it is not cultivated now, but take this glass, and look off there—see where that little rolling hillock is in the land to the west—or right, I suppose I had best say, till I know which is the north, and which the south pole," suggested Morey.

Arcot looked long and quietly. At last he lowered the glass, and handed it to Wade, who sat next to him.

"That looks for all the world like the ruins of a city, but not such ruins as storms make, but ruins such as explosives make. I would say that there had been a war and the people who once lived here had been driven off," said Arcot.

"So would I," rejoined Morey. "I wonder if we can't find the conquerors?"

"Unless it was mutual annihilation!"

They rose a bit higher, and increased the speed to 1000 miles an hour. The roar of the air in the microphone outside made it necessary to shut this off entirely now. On and on they flew, high above the gently rolling plain, mile after mile, and the little brooklet grew to be a great river, and the river kept growing more and more, until, as they came to the range of hills ahead of them, they wondered how it was to thread its way through that mighty natural barrier. As they drew nearer, however, they found that the range of hills was made up more of many short ranges of hills than of one long range. There were many passes through the mountains.

They started through the one that the river followed. They found a great natural basin in the pass, which widened out to a wide, level bowl, and here, in almost the exact center, they saw a looming mass of buildings —a great city!

"Look!" cried Morey in excitement. "I told you it was inhabited!"

"Yes, but if you shout in my ear like that again, you will have to write things out for me hereafter!" objected Arcot, just as excited as Morey, nevertheless.

The great mass of the city was shaped like a titanic cone, that stood a full half mile high, and was fully a mile and a half in radius. But the remarkable thing about it was the perfect uniformity with which the buildings and every structure seemed to conform to this plan. It seemed as though an invisible, but very tangible line had been drawn in the air. "Here shall there be buildings. Beyond this line no structure shall extend, nor any vehicle go!" seemed to be its message. Indeed, the air directly above the city was practically packed with slim, long ships—ships almost too long to be graceful—long, needle-like ships of every size, from tiny private ships of scarcely fifteen feet length to giant freighters of six hundred feet and longer. All conformed to the rule perfectly!

Only about the very base of the city there seemed to be a slight deviation. Where the cone should have touched the ground, there was a series of low, half buried buildings, which seemed to have been made of heavy, dark metal, and all about them the ground appeared scarred and churned. It appeared that all along the base line of the cone the ground was in this condition. It seemed as though the city had been attacked by a rain of some destructive explosive, and the cone was its invulnerable sheet of protection. The little squat buildings were the producers of this defensive weapon.

"They certainly have some kind of a screen of rays over that city. Just look at the perfect cone effect and the low buildings that are undoubtedly the projectors," said Morey.

Arcot had brought the ship to a halt, as he came through the pass in the mountain. The shining hull was in the cleft of the gorge, and was, no doubt, quite hard to see from the city.

SUDDENLY a vagrant ray of the brilliant sun reached down through a cleft in the rock and touched the shining hull with a finger of gold. Instantly the ship shone like the polished mirror of a heliograph.

Almost instantly a low sound came from the far distant city. It was a low pulsing drone that came through the microphone in a weird cadence, a low beating drone, like some wild music. Louder and stronger it grew, rising in pitch slowly, then suddenly it ended in a sudden burst of rising sound, a terrific whoop of alarm.

As if by magic, every ship in the air shot down and out of the air, dropping suddenly out of sight.

"It seems that they have spotted us," said Arcot, in a voice he tried hard to make nonchalant.

A fleet of great long ships was suddenly rising from the neighborhood of the central building, the tallest of the group. They went in a compact, wedge formation and shot swiftly down along the wall of the invisible cone, till they were directly over the low building nearest Arcot and his friends. There was a sudden shimmer in the air. In an instant the ships were through and heading toward the *Ancient Mariner* at a tremendous rate. They had shot forward at an acceleration that had surprised Arcot. They were certainly swift ships! In perfect formation they darted toward the lone, shining ship of far-off Earth.

"Now how shall we signal them?" asked Morey, also trying to be nonchalant, and failing as badly as had Arcot.

"Don't try the light beam method"—the last time they tried to signal with a beam of light was when they signalled the Negrians and started the terrible war of the Black Star.

"Let's just hang here peaceably and see what they do."

Motionless, the little ship hung before the advancing attack of the great battle fleet. The shining hull was a thing of beauty in the golden sunlight, as it waited the advancing ships. They slowed as they approached and spread out in a great fan-shaped crescent as they drew near.

Suddenly the *Ancient Mariner* gave a tremendous leap and was hurtling toward them at a terrific speed, and under an acceleration that was so great that Arcot was nearly hurled into unconsciousness. He would have been, but for the terrific mass of his ship. To produce that acceleration in so great a mass, a tremendous force was needed, a force that made even the fleet over there reel under its blow. But sudden as it was, Arcot had pushed the power into reverse, and had used as great a force to counteract it. The whole mighty fabric of the ship creaked as the titanic load came upon it. They were using a force of a million tons! The mighty lux metal beams stood the stress, however, and the ship came to a halt, then was swiftly backing away from the ships over there.

Suddenly Arcot was aware that his companions were "out," all, that is, except Morey.

"We can give them all they want!" said Arcot grimly.

"Let's not—we may be able to make friends with them, but not if we kill them off," remonstrated Morey.

"Right!" replied Arcot, "but we are going to give them a litle demonstration of power!"

The *Ancient Mariner* leapt suddenly upward with a speed that defied the eyes of the men at the rays of the enemy ships. Then, as they turned to follow the sudden motion of the ship—*it was not there!* It had simply vanished!

"Oh!" said Morey, as he realized what had happened. They were invisible! Arcot had found a use for his apparatus!

Arcot, released from the force of the strange rays, had at once shut off his power, but now he turned it on again, and raced swiftly far off to one side, behind the ships, and, still invisible, hovered over the great cliff that made the edge of the cleft that was the river bed.

He snapped the car suddenly into full visibility. Wade

and Fuller were fully restored now. It had been but a slight, temporary shock from which they had to recover.

"Wade—Fuller—take the molecular ray, Wade, and tear down that cliff; throw it down into the valley. Fuller, turn on the cosmic ray with all the power you can get and burn that refuse he tears down into a heap of molten lava! I want to show them what I can do.

"After you get that cliff down, throw the molten lava high into the air!"

Suddenly, from the ship, a long pencil of faintly violet rays, ionized air it was, reached and touched the cliff. In an instant it had torn down a vast mass of the solid rock, which came raining down in huge masses into the valley, with a roaring thunder and an impetuosity that threw the dirt of the valley into the air like splashed mud. Then the ray died out—and two brilliant rays, rays of blinding brilliance, reached out. The rock was suddenly smoking—steaming, then it was dully red, then quickly brighter, and in a few moments it was flaming brilliant red. It was next a pool of white-hot lava, flowing, running under the influence of the brilliant rays, like ice under an ordinary heat-ray, a flowing liquid, limpid as water.

Again the pale beam joined the brilliant rays and in an instant the great mass of flaming, incandescent rock was flying like a glowing meteor, up into the air. It shot up with terrific speed, broke in the air, and came down as a rain of burning, incandescent matter.

AGAIN the pale beams reached out, two of them now, as the bright rays died out, and they reached down to the level ground. As they touched it, the solid soil spouted into the air, like some vast fountain, to fall back in powder.

The rays that had swung a sun into destruction were at work! What chance had man, or the works of man against such? What mattered a tiny planet when those rays could hurl one mighty sun into another, to blaze up in an awful conflagration that lit space for a million light years about with a mighty blare of light!

As if by a giant plow the valley was torn and rent in great streaks by the pale rays of the molecular force. Wade tore loose a giant boulder, and like a boy tossing a stone into the air and catching it, Fuller hurled the mighty boulder a mile into the air, to allow it to come rushing down, only to send it rocketing far into the heavens. Again he tossed it, then drove it far into the atmosphere—so far it came down with a terrific crash, minutes later, to bury itself deep in the soil, the great boulder splintering to fragments.

Suddenly the *Ancient Mariner* was thrown violently about again. Again rays had gripped it and were drawing it with terrific acceleration. Now, however, the ship was racing toward the city, caught by the beam of one of the low-built, sturdy buildings that housed the main ray projectors. They were racing toward it at tremendous speed, weighed down by the acceleration. Arcot again threw on the mighty power of the units that drove the ship against the power of the beam.

"Wade—use the ray—Fuller—don't use the cosmics—tell you why later!"

The ship was stationary now, quivering under the titanic forces that struggled for it, while the racing ships drove toward them, trying to come to the aid of the men in the tower, amazed at the titanic power this ship displayed.

The pale beam of the molecular beam reached out its ghostly finger—touched the heavy walled ray projector building, and suddenly there was a flash of discharging energy, and the tower was hurled high into the air. A gaping hole in the ground that testified to its removal was all that remained. Instantly, with the collapse of the power that bound them, they shot far into the rear, while Arcot snapped off the power. Then they were invisible again.

They hung motionless, soundless in the air, waiting developments. The battle fleet was cruising about the city, darting here and there. In close formation they blocked the opening in the wall of rays that the removal of the ray power had caused. The rest of the fleet, save a group of three that went to investigate the wreck of the heavy building where it had fallen, a mile away, were circling the city now, darting about, searching frantically for the invisible enemy, fully aware of the danger of collision, not fearing it consciously, but the unnerving tension of expecting it every second, made them erratic and nervous to the nth degree.

"Well, they don't seem to want to play with us," said Arcot, smiling, now that he knew they were safe.

"They don't, don't they? They might at least have been willing to see what we wanted. I want to investigate some other cities. Come on." Morey was angry.

He had thoroughly enjoyed the rest at the side of the little mountain lake, and he was disappointed that they had been driven away—or better, not received. Had they wanted to, he knew, they could readily have torn the entire city out by the roots!

"I think we ought to smash them thoroughly. They certainly are inhospitable people!" said Wade.

"And I, for one, would like to know why it was you didn't want to use the cosmics, and what that attractive ray was," said Fuller curiously.

"The ray is easily understood, after you look at the wreck it made of some of these instruments. It was projected magnetism. I can see how it might be done, if you worked on it long enough. The ray simply attracted everything in its path that was magnetic. As you know, lux metal is magnetic. The result was that the ship was strongly attracted, and we felt the results. Most of our apparatus luckily was insulated against magnetism because of the effects of the tremendous currents that flow through the coil leads. The little that was not, was not sufficiently important to worry about at the time. Wade will find his apparatus out in the galley, rather thrown about, however.

"The only thing that was actually effected was the absorption of cosmic rays by our molecular motion power units, for they are designed to use the cosmic rays as a source of heat, and when the magnetic field strikes relux metal, instead of absorbing the rays directly as heat, you remember the cosmic rays are converted directly into electricity. It made very little difference, however, for the electricity was promptly converted into heat by the eddy currents in the conducting relux.

"However, the relux would have made a bad mirror under those circumstances and your ray would have merely melted the projector, then a hole in our own ship, if you tried to use it, when in the magnetic field. Of course, the molecular ray was unaffected by that force—as witness that little fort they had there. I didn't like to have to do that, but I don't care to remain on this world permanently, alive or dead, and we might have been permanently disabled in a few minutes, with that fleet coming after us."

"But what's next?" the others asked in one voice.

"Well, this world is bigger than ours. Even if they are afraid to go out of their cities to run farms, they must have other cities. The thing that puzzles me, though, is how they do it—I don't see how they can possibly raise enough food for a city in the area they have available," said Morey.

" 'People couldn't possibly live in hydrogen, instead of oxygen!' they all said when I made my little announcement at the meeting on the Black Star situation. The

only trouble was, they did. That suggestion of yours meets the same fate, Morey," grinned Arcot.

"All right—you win—but let's see if we can't find the other nations on this world more friendly."

"I am now well north of the equator. I am going up where the air is thin, and will put on some speed and go well south, into the south temperate zone, and see if I can't find some people there in the dawn region of the world at present, who are more peaceably inclined."

The ship became visible suddenly. Instantly all the ships of the enemy in their near neighborhood turned at a speed that made their efforts futile, and darted toward it at top speed, but the shining *Ancient Mariner* darted into the deep blue vault of the sky, and a moment later was lost to their view. These men must have felt relieved—at least temporarily!

"Well, they had courage," said Arcot, looking at the city as it sank out of sight. "It does not take one-quarter as much courage to fight a known enemy, no matter how deadly, as it does to fight an unknown enemy force—something that can disappear and reappear mysteriously, that can tear down mountains and throws their great forts into the air like play toys. No, they had courage, but I wish they weren't quite so anxious to display it!"

THEY were high above the ground now, and they were accelerating with a force of one gravity. In a moment Arcot cut it down till the air resistance was just being overcome, and at the height they were now flying, it was very little. The sky was black above them, and the stars were showing about the blazing star that was the sun. They were unfamiliar stars, the stars of another universe.

In a very short time the ship was dropping rapidly downward again, the horizontal power off, the air rapidly slowing them. They were drifting high over the south temperate zone now, speeding on, as the rolling terrain spread out beneath them. Far ahead they distinguished the bright, metallic glint of a great expanse of water. They sped on, and in a moment they were sailing out across it at high speed. It swept behind them, hundreds of miles on each side, and as far as the eye could see, there was only the smooth water, extending to a tremendous distance.

"They don't lack for water, do they?" said Wade.

"No, I assumed that, from the fact that all the land we have passed over has been green and fertile. There seem to be a great many streams, too, and see that great mass of clouds there? That represents tons of water no doubt, that will probably be precipitated on the land somewhere.

"Look—there is the other shore!"

Far ahead, a low mass of solid land was obtruding above the blue of the horizon.

It was not a continent they were approaching, however, but a great island, that stretched for hundreds of miles to their north and south. They were approaching from the west.

THEY sailed over it, at a height of thirty miles. They sank now, as the mountainous terrain became so rough, that from their elevation it would be impossible to detect a city. On and on they flew, slower now, lest they miss the object of their search. They expected to find the city hidden among the rocky mountains.

The green defiles of the great mountain certainly made the city hard to spot, and further, Arcot realized that no great number of ships would be able to attack the ray stations if they could not get in from the sides, but only from the top, and, piled one on the other, as they must be for aerial attack, the efficacy of bombs dropped, was greatly reduced. Unable to attack from the sides, they would be at a great disadvantage. These cities were surely located with an eye for war! What conflict was this that had lasted so long that cities were designed for perpetual wartime conditions? Had they never had peace?

"Look—there's another city!" called Fuller. Below them, there was another of the cone cities. It also was located in a little natural bowl. Three mountain ranges seemed to meet and fall off here, and in the narrow pass left, a broad river flowed down to the sea. But still, it was impossible to get more than a few ships beside the city. The *Ancient Mariner* was high above the city now, and its shining hull, against the brilliance of the sky, made it quite as invisible as any apparatus might have. But they were sinking now, and as they came lower, it became apparent that they were not over the city, but were a mile west of the main building that made the cone.

At last they had come quite low. There were no ships in the air now, and no people in sight.

Suddenly Arcot heard a low hum, and, looking about him in surprise, saw a long, dim shape darting up toward the ship at terrific speed. It was painted a dark mottled green, and against the background of the ground, was well nigh invisible.

"Wade!—catch that on the ray!" said Arcot sharply, darting swiftly to one side. Instantly the swift torpedo, for as such Arcot had classified it, turned, and was coming toward them still. A pale beam reached out, and the little torpedo was suddenly dashing toward the ground with terrific speed, miles a second. Long before the power that drove it could stop it, it had crashed violently to the ground. There was a terrific flash of flame, and a dull concussion, and a great hole gaped in the ground.

"They sure know their chemistry!" remarked Wade, looking down at the great hole the explosion had torn in the ground. "That was no mild dynamite or nitroglycerine. I would like to know what they use!"

"Personally, I think that's a rather more or less, principally the latter, gentle hint to move on. What do you say?" Arcot was becoming decidedly angry at the way they were being received. He had wanted to meet these people. Of course, the other planet might be inhabited—but then again it might not be!

"I wonder—Arcot. Obviously they were warned against our attack—probably by that other city. Now we have come nearly half around this world, certainly we couldn't have gone much further away, and still be on the planet. This city is, then, in league with our original attackers. Since this league goes half around the world, and they evidently expected us to do the same, why not go further? If we find that city also armed and ready, it will be fair to assume, just on the basis of the geographical separation, that all this world is in one league," said Morey.

"Hmm—an interplanetary war. That would certainly prove that one of the other planets is inhabited. Next question: Which one?"

"The most probable one would be that which we called Aphrodite," replied Morey.

Arcot had driven the ship so far into the sky that they were effectively invisible. They were holding a brief consultation of war. What next?

"If that is so, and I think we have good reason to believe it is, for people on this planet would certainly end a war after over a century or so of warfare, I think we might just as well leave this planet, and see if their neighbors are less aggressive."

"I agree, Arcot, and I certainly hold no deep love for these men. They certainly are hard to get along with," said Morey sourly.

"Well, so be it. Here we go!" And with that, Arcot shot the car straight up, and at the same time rotated it, till it was pointing its bow straight away from the planet. As they drew away, Arcot increased the acceleration, till, as they left the air, he turned the acceleration to a full four gravities.

At the same time he redirected the motion of the ship till he felt confident he had overcome the orbital motion of the planet they had just left, and any velocity they now had would be accelerated by the gravity of the brilliant sun.

The other planet was nearly a quadrant of its orbit away from the planet they had just left and as Aphrodite was a full 50,000,000 miles away from Terra in any case, it made a long trip.

"I am going to shorten things up and throw us into space control. We lose a lot of energy that way, but what of it? Lead is cheap, and before we're through, we will have plenty, or I'll know the reason why," said Arcot. Arcot was becoming angry. He had hoped to make a peaceable, friendly landing on that inviting planet, so much like his own home planet, and the rebuffs he had received annoyed him. He decided that if there was no other way, he would capture one of their ships, speak with the men personally, and then send them back to carry his message.

THERE was the familiar tension in the air as the space field built up and they were hurled suddenly forward, the star-like dot of the planet suddenly expanding as they rushed forward at a speed far greater than that of light. In a moment it had grown to a disc, and Arcot had stopped the space control. Again they were moving forward on molecular power. There was no need to accelerate, as they drew near the planet, for they were already so near that they would soon have to begin their deceleration. In ten minutes they were beginning to feel the outermost wisps of the cloud-filled air. Here the heat of the blazing sun was exceedingly intense, and the clouds were no doubt a very welcome condition. This planet was, no doubt, a very hot place, far warmer than the Earthmen would find comfortable. They would have been far better suited to remain on that other planet, but they very evidently weren't wanted!

They were slowing now, and dropping down, through the atmosphere of the planet. Here they had very nearly their Earth weight, for this planet was very nearly the same size, and apparently had the same density as that of the Earth.

They sank for miles as the ship slowed to the retarding influence of both air and molecular power. At last they had sunk fully fifty miles to the highest of the upreaching mists, a thin wisp of cloud. After that they passed through mile after mile of the cloud-layer, while the air grew more and more tepid.

Suddenly, the thick, all-enveloping mists that had held them were gone. They were flying smoothly along under leaden skies, perpetual dim, dark clouds. Despite the bright sunshine, the clouds made the day a dim, gray thing, and they reflected such an enormous percentage of the light that struck them, that the climate was not exceedingly hot, they learned, when they sank anoher fifty miles toward the soil below.

The ground was dark, under its somber mantle of clouds, and the hills, with the rivers crawling their tortuous way across the wide plains, seemed strange details modeled in a great mass of greenish-gray putty. It was a discouraging world.

"I'm glad we didn't wait for our picnic here. It sure looks like rain!" remarked Wade.

At last they hung motionless at ten miles. Wade set to work once more with his chemical analysis. In fifteen minutes his report was ready.

"They have a fine atmosphere. They have fifteen per cent oxygen at the surface, and seventeen pounds pressure. Temperature here about 40, but due to the cloud bank, I can't extrapolate for ground temperature. I can't tell how much heat that holds. The remaining percentage of the air is practically all nitrogen, with the usual trace of CO_2 and plenty of water vapor. Sweating won't help an animal to cool his body much here! The air is saturated almost, and the cooling by evaporation would be useless. It wouldn't cool. A canary seems to have to breathe a bit fast, but it isn't bothered by it. I imagine that the air has a better percentage of oxygen down below; it is so on Earth."

"Wade, why is oxygen so plentiful on all these planets? It was plentiful on Earth, Venus, Mars, on the frozen planet we found, and on Terra and now on Aphrodite here. What is the reason?" asked Fuller.

"I don't know—that's atomic structure, and as such, goes to Morey or Arcot," replied Wade, looking questioningly at Arcot.

"I can't say for certain—but I believe it is due to the very stable arrangement of the protons and electrons in the nucleus. Oxygen is just four times as heavy as helium, and probably it is due to the very stable configuration of the protons. I can't say why, or how this is more stable, however."

They were sinking rapidly now, and at the same time rocketing smoothly along the ground toward the sea that, Arcot believed, he had seen in the far distance. Swiftly the ground fled behind them, and the low plain, sloping toward the sea, at last revealed it behind a low roll in the land, a vast, level surface of cold, gray water, of a changeless, leaden hue.

"My, what a pleasant world!" said Fuller sarcastically. It certainly was not an inspiring scene. The leaden skies, the heavy clouds, the dark land, and the leaden green of the sea, always shaded in perpetual half-light, lest the burning sun heat them beyond endurance—it was a gloomy world!

THEY turned and followed the coast. Still no sign of inhabitants was visible. Mile after mile passed beneath them as the shining ship followed up the coast, a ragged level shore, small indentations and baylets seemed to run into a shallow level sea. This world had no moon, and it was tideless, save for slight solar tides.

Finally, far ahead of them, loomed a mountain range, back from the coast, and Arcot headed in toward it.

"I expect," he explained, "that these people, if, as we suspect, they are at war with our very inimical friends of that other planet, will also have cities placed in the mountains."

They had such cities. They had penetrated less than a hundred miles along the twisted ranges of the mountains before they saw, far ahead, a great cone-shaped city. These cities were taller, larger, and in them the cone ran up further from the actual city buildings, leaving the airships more room.

Arcot stopped and watched the city for a long time, looking through his telescope. In all respects it seemed like that other one. The same type of needle-like ships, the same type of cone ray projectors nestled at the base of the city's invisible protection.

Then they moved nearer. The ship drew slowly down, till they were scarcely a mile from the surface. Suddenly, without any warning signal, apparently, the air traffic they had seen was suddenly in wild movement, and then it was gone. Every ship seemed to have ducked into some unseen place of refuge. In a moment a fleet of battleships was winging its way toward the invisible barrier. Then it was out, and in a great semi-cylinder, a quarter of a mile high, and a quarter of a mile in

radius, they advanced, with the *Ancient Mariner* as their objective. Arcot remained motionless. He knew their only weapon was magnetic rays, for had they had a more deadly weapon, the war would have been over already, and he knew that he could combat that ray easily and safely.

Slowly the Aphroditian ships advanced, and at last halted a quarter-mile from the Earthmen. A single ship detached itself from the mass, a single, large needle-shaped machine.

"Morey—the controls—I can use the telepathy best—I am going to parley with them, for they don't seem to want a battle on the first occasion. Come on."

Quickly Arcot jumped to his feet and ran the length of the corridor, to his room, and slipped on the power suit. A moment later he was in the airlock, and then, as the outer door opened, he launched himself into space. He quickly adjusted his weight, and an instant later he was flying swiftly toward the ship that had come forward, alone. But armed as he was with his molecular ray pistol and cosmic ray pistol, he was probably more than a match for anything the fleet had displayed on that other world!

He went directly toward the broad expanse of glass that marked the pilot house and looked in curiously. He was a man much like Arcot, quite tall, apparently, but a man of tremendous girth, with a huge chest, and great powerful arms. His hands, like the Venerians, had two thumbs. With equal curiosity he stared at Arcot, floating in the air without apparent means of support. Arcot hung there a moment, then he motioned that he wished to enter. The giant Aphroditian motioned him around to the side of the ship. Half way down the length Arcot saw a door suddenly open, and he flew swiftly forward and entered. There was a corridor running along the side of the ship, just within the wall. There was one man here, a giant as tall as Wade, but with tremendously massive shoulders, and giant chest, his thighs rounded under a close-fitting gray uniform, seemed bulging with smooth muscle. He was considerably larger than the man he had seen in the pilot room, and the other one had been a very pale yellow, while this man was burned to a more healthy appearing shade of tan. His features were regular and pleasing; his hair was black and straight; his wide forehead denoted a high degree of intelligence, and his clear black eyes, under heavy black eyebrows, seemed curious, but friendly.

His nose was rather thin, and yet not sharp, and his small mouth was curved now in a smile of welcome. His chin was firm and sharp, distinct from his face and neck. The chin is one of the principal differences between man and the higher animals. No other animal has a true chin.

The other man was looking Arcot over as Arcot inspected him.

Arcot smiled at him, as their eyes met.

"Torlos," he said, pointing to his great chest.

"Arcot," replied the Earth man, pointing to himself, then, to the stranger, "Torlos."

The stranger shook his head from left to right, smiling in approval. "Ahcut," he said, pointing to the Terrestrian, and again to himself, repeating the left to right motion of his head, "Torlos."

Again he looked at Arcot. He pointed to the comparatively thin arms of the Terrestrian, and to his own and smiled; then he pointed to Arcot's head and to the mechanism he wore on his back, then to his own head, and indicated walking with great effort. He turned again to Arcot, smiling, and pointed again to the mechanism, and Arcot's head, nodding his head in approval. Arcot laughed. He saw Arcot was comparatively weak, but he had no need of muscle, for he made his head and his machines work for him. He decided that the head was better!

Arcot reached out and touched the man's face, and turned him so that their eyes met. Then he concentrated on the idea of friendship. The black eyes that he was staring into suddenly widened in surprise, then with joy, he tried to concentrate on one thought. It was very difficult to interpret the thoughts of this other man, his thoughts were so different, all his concepts were in different form. But at last Arcot interpreted the idea as one of location, but the thing that had made it so hard to vision, was that it was location in the interrogative. Now how was one to imagine that?

AT last Arcot realized what it was he asked, and took over toward the door, where the thin grey light of this dull world filtered in through the open doorway. From his pocket he drew a pad of paper and a pencil. Rapidly he sketched the Island Universe, with a countless number of dots for stars, and then swept his hand all about him. He pointed to the planet, and on a second sheet he indicated that the planet described an orbit about their sun. Then he indicated the sun in its approximate relation to the rest of the Universes, as a dot. The man looked in surprise and shook his head from right to left, interestedly. Arcot sketched a second Island Universe, then drew a thin dotted line from one to the other, and pointed to the ship that had brought them. In incredulous wonder the man looked at him. Again he pointed to the great muscles of his arms, and then to Arcot's brain, and indicated his preference. Arcot smiled, and then indicated the city. Could they go there?

Torlos turned and glanced toward the end of the corridor. There was no one in sight. He shouted an order in his deep, pleasant voice, and instantly another giant man came striding down the corridor with a lithe softness that indicated tremendous muscular power, excellently controlled. He saluted by placing his left hand over the right side of his chest. Torlos replied, and Arcot noted this for future reference.

Torlos spoke to him a moment. Then he disappeared. A minute later he returned and said something to Torlos. Torlos turned to Arcot and wagged his head once more, and indicated that he should return to his ship and follow them.

He looked curiously at Arcot as he prepared to start, then reached out one hand and grasped Arcot's power suit harness, and with one hand, at arm's length, lifted him easily from the floor without visible effort. He gently returned him to the floor, while Arcot looked in amazement at him. Torlos smiled, and pointed again at the small arm and the large.

Arcot suddenly turned his eyes once more into the black eyes of Torlos and stared fixedly.

"Torlos, will you come with us on our ship?"

"I am commander of this ship, and I cannot go without permission of my chief. I will ask my chief," he telegraphed mentally.

Again he turned and left Arcot for a moment. Inside of a minute and a half he had returned, carrying a small handbag, to which a disc-shaped piece of metal was wired. This was strapped to his chest.

"I can go. This keeps me in communication with the ship."

"Radio," thought Arcot negligently, as he turned toward the door. To him it was a thing centuries old, but Torlos looked in surprise as he grasped this full thought. It was a wonderful thing to their world!

Arcot went to the doorway. He adjusted his weight to zero and floated lightly into the air. He rose about six feet above the landing, and then indicated to Tor-

los that he was to grasp his feet, one in each hand. A moment later Torlos had closed a grip of steel about Arcot's ankles and let himself off the platform. At once they dropped, for Arcot was not adjusted to this load. They fell very quickly, of course, and Arcot cried out, as Torlos, in his surprise at not floating, involuntarily gripped Arcot more tightly. Quickly Arcot turned on more power, and gasped in surprise as he felt the weight mount swiftly. He had estimated the man's weight at 270 or so. It was easily three hundred and fifty pounds! Soon, however, he had the weight adjusted, and they floated easily up, and toward the *Ancient Mariner*. In a moment more Arcot had floated through the doors of the ship, and once inside, Torlos released his hold, with the result that Arcot "fell" to the roof with a weight of 350 pounds and received a correspondingly severe jolt. A moment later he was again on the floor, rubbing his back. He shook his head and frowned, then smiled and pretended to limp.

"Don't let go so suddenly," he admonished telepathetically.

"I did not know. I am sorry," was the telepathic reply from Torlos.

"Who is your friend?" asked Wade, suddenly entering. "He sure looks like a husky customer."

"He is—and he must be weighted with lead. Lord! I thought he would pull my legs off. Look at those arms!'

"I don't want to get him mad at me; he would make a mean opponent." Wade smiled genially as he advanced and felt of the giant arm.

"What's his name?" asked Wade at last.

"Torlos," replied Arcot, just as Fuller appeared on the scene.

Torlos had been looking about the room, and now he had found what he wanted, it seemed, for he brought back a heavy crowbar that they had used when they had their little swim and picnic on the other planet.

He looked at it rather skeptically, and taking it in his hands, flexed it in a bit as he might flex a rapier to test its material. Then, rather displeased, it seemed, he held it out far in front of him, and tied the inch thick metal bar into a neat knot! Then he untied it, and straightened the bar as best he could, and handed it back to Arcot, smiling.

Arcot and his friends were staring in utter astonishment at the terrific strength the man displayed. He was smiling now as they turned to him again.

"If he can do that with his arms, at arms' length, what would his legs do, when he was really working?" asked Wade thoughtfully.

"Why don't you try and see?" asked Fuller sweetly.

"I can think of easier, but no quicker ways of committing suicide," replied Wade.

Arcot laughed and, looking at Torlos, translated, in main, the last remarks of his friends. Torlos joined them in the laugh.

"All my people are strong. I can not understand why you are not. That, I see, was a tool. We could not use it so, it is too weak."

As Arcot translated, Wade laughed and said, "They probably use old I beams to tie packages up with!"

"We are supposed to follow these men into their city, to have some kind of an audience with their ruler, according to Torlos," interrupted Arcot, after a moment's consultation with Torlos. "Let's start now. The rest of the fleet must be waiting."

ARCOT led Torlos through the engine room, and was going toward the main coil room, when Torlos stopped him, and, in surprise, asked him, telepathically, if this were all the apparatus. On being told that this, and the coils in the next room constituted the entire apparatus, he said, or thought, "It is smaller than the power equipment of a small private machine. How could you make so great a distance?"

Arcot drew his molecular ray pistol and showed it to Torlos. "This, alone," thought he, "is powerful enough to destroy all your battle fleet, and without any danger on our part! And, despite your strength, you are helpless against me, for look!" Arcot touched a little switch on his power suit, and—he was not there! In vast amazement, Torlos cried out and searched for him, but he was nowhere to be seen. Suddenly he cried out, and reached up for something had touched him on the head. Again he was reaching for something that brushed his arm—but it was hopeless! Then suddenly, to his immense astonishment, Arcot was standing, or better, floating in the air just before him. Arcot landed, laughing.

"What avails strength against air, Torlos?"

"For safety's sake, I wish to be your friend!" thought Torlos, in reply, smiling at him as he thought it.

They went on through the coil room, where power lay harnessed even now, which, released, would rock the planet in its orbit, or, if otherwise released, could throw the planet into the blazing sun. But it was small and Torlos wondered at the smallness, not at the unknown might!

They passed quickly up to the control room now, and into the front of the ship.

"Come on—these men are signalling for action," called Morey, from the controls.

They started now, and the other ships followed at once, soon leading the way.

"I wonder if it might not be a good idea to display our hand, and show them what is in store, if they try any unpleasantness?" asked Wade, looking at the great buildings they were gliding toward.

"I don't know—but I think not. It is more effective as a surprise, and in any case, it is probable that they are friendly, but cautious. Our strange appearance may have convinced them, for evidently we are not like the people of that other world, for Torlos was surprised. At any rate, I wish to communicate with Torlos, so keep quiet, please," said Arcot, turning to Torlos.

"Where are we going?" thought he, staring fixedly towards the stranger.

"This is the capital of this world, Sator, and here is the commander-of-all-military-and-civil-forces. It is he you will see. He has been summoned," replied Torlos.

"There is another planet in this system, like this one, inhabited. We visited this other world first, and they repulsed us; we tried to be friendly, but they attacked us at once. Their ship came out and tried to drive us off. With our rays we tore down the mountains that surrounded their city, and still they attacked us, and in order that we be not damaged, we were forced to destroy one of their city-protecting-ray buildings." This last thought was hard to transmit, although the idea of tearing down a mountain, and the picture of its flaming, crumbled fragments was very clear.

In sudden anxiety and concern, Torlos stared into Arcot's eyes. And in that look Arcot read what even mental telepathy had hidden heretofore.

"Did you destroy the city?" asked Torlos anxiously, but it was not the question of an enemy hoping for the destruction of his enemies' city; it was the idea of a city, the mental picture of a city, but with it Arcot caught the idea of home! He attributed this, naturally, to the idea that "city" was, on this world, "home," for they seemed never to leave the cities. Still, why this feeling of worry?

"No, we did not wish to injure them. We destroyed the ray building only in self defense."

"I understand." There was, despite obvious mental efforts, an idea of relief in this!

He rose about six feet above the landing, and then indicated to Torlos that he was to grasp his feet, one in each hand.

"Are you at war with that world?" asked Arcot.

"For many generations we have been at war—the two worlds struggling for supremacy. At one time this world alone seemed populated, but at last the people of Nansal came out of the forest homes they had built, and with a rejuvenated science they built the cities you saw. I will tell you more later.

"Now we are approaching the leader of all the forces of Sator. He is all powerful here. His word must be absolutely obeyed. It is wise that you do not unnecessarily offend him. I see from what your mind tells me that you have great power, but there are many many ships in Sator, more than Nansal can boast.

"Our commander, Horlan, is a military commander, but as every man is necessarily a soldier, he is a true ruler."

Arcot addressed his friends.

"Morey, we are going to visit the ruler of this world. He is an absolute ruler, by virtue of ruling the army, which runs everything here. Now when we go to see him, I think you had best go along. Wade and Fuller can stay here as a rear guard. It will be a little safer. I don't think it is at all dangerous, but after being blown off of one world I like to be safe. Also, the people of this world sure could use this machine to clean out that other world.

"Wade, suppose you take over the controls while Morey is putting on his power suit. I am going to take a radio, of course. Also make sure that you have your ray pistols along, and that the invisibility apparatus is working. You know it might be handy after all!" said Arcot.

They had followed the great fleet of Satorian ships, and now, at last, they had come to the magnetic barrier. As they reached it, it was suddenly lowered and gone. The fleet passed through, and the *Ancient Mariner* followed.

THEY were in the city. Below them the great buildings were piled high in the gray light of this gray world, its massiveness seemed only to accentuate the depressing light.

On the broad roofs below them, they saw that there were hundreds of strange people coming out to watch them as they came across the city. It was the first friendly stranger ship they had ever seen, Torlos said. All the planets had been explored, and he could not understand how they could cross such vast spaces. How could they go so fast? He evidently had some conception of the speed-of-light limit. Arcot replied that he would explain when they had more time.

The buildings were sloping up now. Higher and higher they rose as they entered the cone city. The fleet going ahead of them was slowing now, as the mass of the great central building loomed grey before them. Then they were motionless, hanging suspended in the still air. Then they were dropping vertically into a great courtyard that surrounded the building. They dropped down and down, till at last they landed lightly on the broad, soft turf-covered court, and the men came out of them, rapidly forming into ordered squads and marching swiftly away. The men from Torlos' ship came out, and formed, then marched directly to where the *Ancient Mariner* had landed, close to the great arched door of the mighty tower, where Torlos had indicated they should land. In a moment they had formed into two neat rows, one on each side of the airlock.

"Come on Morey, we are wanted. And keep the radio going at full amplification. The building may cut out the waves. I'll try to keep you posted on what is going on, Wade, but we will be busy, probably, answering questions telepathically," said Arcot, as they followed Torlos down the corridor.

They were quickly out in the dim light of the grey sky and walking across the courtyard, between the ranks of soldiers from Torlos' ship. They walked directly to the great door, a heavy gate of solid bronze, on great bronze hinges, but obviously designed only for show. Still, it would have been effective against attack.

The building seemed to be made of a dense, grey stone, much like granite, but depressing in its perfectly unrelieved front. There were no bright spots of color as on all earthly buildings and Venerian structures. Even the lines were grimly utilitarian. There seemed to be no decoration.

Through the great bronze door they walked and across a small vestibule. Then they were in a mighty concourse, a giant room that went completely through the structure, and great granite pillars rose to support the mighty building above. Square cut, they lent but little grace to the mighty room, but the floor was made of a dense, hard, green stone, as Arcot discovered when he examined it, much to the surprise of the soldiery behind. The walls of the room were of the same light green stone, almost the color of natural foliage.

On one wall there was a giant tablet, a great plaque fifteen feet high, made of a deep violet stone, almost black, and inlaid on it was a series of characters in the language of this world. Like ordinary terrestrial characters, they ran from one side to the other. Their order of reading was, of course, quite indeterminate. The letters themselves were inlaid in some red metal, a rather deep colored metal, and one quite unknown to Arcot and Morey.

Arcot turned to Torlos, and looking at him fixedly, asked, "What is that tablet?"

"That is the tablet on which is inscribed the name of each of our mighty leaders since the Great War began. Ever since the war with the other planet, Nansal, the names of our leaders have been inscribed in the rarest metal on that tablet."

The "rarest metal" was definite to Torlos, and Arcot decided to question him further when time permitted, as to the meaning of it.

BUT now, as they swung swiftly across the great hall, they reached what was evidently an elevator. A folding door, made in sections, was folded back as they came, and now as they entered, Arcot, Morey, Torlos, and the second in command of the ship Torlos had been on, the operator pushed a small button, and with the hiss of air, the door shut. A moment later Arcot and Morey staggered under a sudden terrific load, their knees bent, and they nearly fell as the car shot upwards under an acceleration of at least three gravities! It continued just long enough for the three Earthmen to get accustomed to it, then it was snapped off, and suddenly they went flying up to the ceiling of the car, as it continued upwards under its own momentum. It stopped slowly under the influence of the planet's gravity, and they stopped exactly opposite the doorway of a higher floor.

"Whew—some elevator!" exclaimed Morey as he stepped out, his knees rather bending, as he tried to readjust himself. "That certainly is a violent way of getting upstairs. That wasn't designed by a lazy man, or a cripple! I prefer to walk! Now what I really want to know is how on—Sator—the old people get upstairs? Or do they die young? Boy, I feel weak after that. That is even worse than the ship under full power!

"I was a bit disconcerted by that, and I am even more disconcerted by another thing. I noticed that none of the Satorians seemed bothered by the extremes of acceleration. They actually jumped a little off the floor

when we started and did not seem to experience much difficulty when we stopped. Of course, they held on to the straps there, which we did not, but they did not seem as heavily oppressed by the original acceleration.

"That, and one other thing, have made me draw a rather surprising conclusion. It also fits into the curious thought-picture Torlos had for one thing." He paused, and turned to Torlos, and looked at him fixedly once more.

"You once gave me the thought idea 'Bone-material' what is that?" Torlos looked at him in surprise, and then pointed mutely to a heavy belt he wore, made of links of iron wire, woven closely together, like the old chain mail, but finer and more flexible.

"I was right, Morey! These men have *iron bones!* Their bones are made of the pure metal! Just think of the advantages! They have bones that are far more powerful than ours, weight for weight. Just think, we can not make our buildings very tall if we use stone alone. In the modern buildings, of course, we have nothing but steel skeleton, with the building and all it contains just draped about it! They have the same! It is a steel, or iron skeleton, with their flesh draped about it! How poor a thing is stone to make a skeleton of! It is more resistant to corrosion, but skin corrodes so easily, why worry about the bones? Iron never rusts in an alkaline solution, and the body is always alkaline. And certainly if the body can deposit the molecules of calcium phosphate into the crystalline structure of the bones, and leave the channels for blood vessels, and the nerves can make stone grow, why not iron? A stone can grow—and if that is conceivable, certainly we can appreciate that a structure of iron can grow! The whole process is merely accretion, and growth of crystals and iron is as crystalline as stone. And certainly easier to use, for just think how vastly stronger it is!

"Do you remember that he tied that crowbar into a knot, then untied it? You didn't see it, but I swear he did that as easily as I would tie a knot in a piece of 00 gauge wire! Then he untied it and straightened it. Now, it would be impossible for a man with stone bones to do that. He couldn't, for his bones, which would not be any heavier than the crowbar, would break under a lesser strain. The crowbar is stronger than any man's bones. I could scarcely believe it as I watched, but I can see that with the heavier bones of iron, and the fact that they are cylindrical, which makes them stronger per pound than ordinary straight bones would be—I mean solid bones—I can see how he could do that now!" Arcot was talking rapidly, as he walked along with Morey, down a long corridor of white. But Arcot was too interested to notice.

"The second fact that confirms my theory was that elevator. Of course it is obvious how it is operated. That elevator is merely a little piece of iron in the path of a magnetic beam, and it is pulled up with a terrific acceleration. Now, if these men have iron bones, they will, in a fair degree, be similarly influenced, and they will not feel the acceleration so greatly."

"Say—that would be some skeleton!" interrupted Morey. "But I was wondering about the chemistry of it. Remember, that stone is a compound, while iron is an element. Can the living cells handle this as readily as they handle the compound?"

"I think so, Morey," said Arcot. "Remember that we know many forms of bacteria on Earth that can release hydrogen from water, using the energy of sugars, ferments they are, and burning sugar, releasing part of the energy as the chemical energy of hydrogen element, and the rest, of course, as heat. If bacteria can do that, why not have living cells that can release iron? Certainly it is possible!"

"Well, there will be difficulties, Arcot. There should be people here then, who, through accident, have received bent arms. These arms wouldn't break!"

"No, and it is seldom that we get broken bones, except when the bone is subject to an actual twisting force, and any twisting force that is great enough to break or bend these bones would destroy the flesh. Ordinarily, the damage is more apt to be a dislocation. But I admit, these men could have bent bones. But then," Arcot smiled, "I have seen men who certainly seemed to have leg bones bent into a parenthesis!"

"And with these famous magnetic bones of yours, I think it would be dangerous to have the magnetic apparatus around, let alone to use it in elevators. If they get magnetized, they won't be able to move! What a revenge! Wrap a coil of wire around your enemy's leg and turn it into a magnet—he can't keep his legs apart to walk!" laughed Morey.

"Say, a fine physicist *you* turned out to be! Did you ever see a piece of pure iron that was magnetized without having a coil of wire around it? Iron can be magnetized only by the electro-magnetic effects of a current. As soon as the current is broken, the magnetism collapses! Naturally, as soon as they get out of the elevator their bones become demagnetized, and they proceed as usual. There are dangers, of course, but then, we use electricity, which is deadly to us, and the molecular rays are deadly, and the cosmic rays are certainly dangerous."

"We seem to be here," interrupted Morey, "so let's wait, and continue this discussion later."

THEIR party had stopped just outside a large door, carved elaborately. There were four guards, armed with a sort of pistol, which, as the Earth men found later, were pneumatic pistols, storing their air in a small tank in the handle, under terrific pressure, for, at room temperature, air cannot liquefy under any pressure. It will stand any pressure that can be brought upon it without liquefaction. These weapons were able to project a small metal slug, cylindrical with a conical point, and hurled through a rifled barrel, a distance of little short of a mile, a very effective weapon, except that they would fire but four times and that slowly.

As Arcot and Morey approached, Torlos stepped forward, and spoke briefly with the guard. The man saluted and they opened the door. They walked in and entered a large room, where many men were seated about a large crescent-shaped table, in whose middle, at the center of the crescent curve there sat a single man in a uniform of grey, as usual, but so bedecked with medals of a red metal, and insignia, with ribbons and decorations, that his uniform was scarcely visible.

The entire assemblage rose and the leader, as Arcot at once assumed him to be, rose also.

Arcot snapped to the attention of the interplanetary guards and saluted, while Morey did the same.

"We greet you, in the name of our planet. We come in peace, may we remain so, and so depart at a later time," said Arcot, realizing that he would not be understood.

In his own language the leader replied, putting his hands to his hips with a definite motion, and at the same time shaking his head from side to side. Some sort of a higher salute, Arcot decided.

He watched the man while he spoke. He was a taller man than Torlos, but less heavily built, as were all these others here. It seemed that Torlos was unusually powerful, even for this world.

When he had finished speaking, Arcot smiled, and shrugged his shoulders, then turned quickly toward Torlos and motioned him toward him. Again he projected his thoughts to him.

"Tell your leader, Torlos, that we come from a planet far away across the vast depths of space, and we come in peace, we wish to stay a short time in peace, and we will leave in peace, but before we leave we will give certain gifts that will well repay him for any trouble we may cause him. I will communicate through you, for we have learned to communicate easily.

"Tell him of our weapons, that which can tear down mountains, and can fuse them into running lava—these weapons will we give him when we leave. His scientists can readily copy them and make them in quantities. Also, the weapon is at once our weapon and our power, for with it he can make ships such as ours—ships that can travel far faster than any ship you have. Yours are driven by magnetism, while ours are driven by another power, the power of the molecules. With these rays can we turn this very planet from its orbit and hurl it into the sun, or so we could do with Nansal. If this is done, your war will be at an end.

"In return we ask only peace while we stay, and some wire made of the element lead, which is our fuel, and directions from your astronomers as to how we may reach home. We have come far and we have lost the way to return. This, and fuel, lead wires, we ask."

Torlos turned, and for several minutes he spoke to his leader in a deep, powerful voice. Meanwhile, Morey was trying to get in communication with the ship. The walls, however, seemed of metal, and no radio waves would penetrate.

"I can't get through to the ship, and they can't reach us, Arcot," said Morey, disappointed.

"I rather feared we might not be able to do so, but that is all right. Our proposition is too good. They won't turn it down!"

Torlos was turning to Arcot now, for the Emperor had replied.

"The Commanding One asks that you prove the possibilities of your weapons. His scientists tell him that it is impossible to make the trip that you claim to have made." Arcot laughed when he received this message, and turned a bit to Morey. "They say that the scientists here declare the trip we made was impossible. I would certainly have agreed with them myself a year ago. How do they want me to prove it?" He turned to Torlos, and concentrated.

"What your scientists say is true, to an extent. They have learned that no body can go faster than the speed of light. Is that not so?" Torlos repeated this question. "Yes, such they say is the fact, and to have made this trip, you must, of necessity be not less than 20,000,000 years old!"

"But they are wrong! Do they know all the secrets of nature. Are there not some things that they may yet learn? Say this: the speed of light is a thing that is fixed by the nature of space. This is truth, is it not?"

"They agree, they know not all the secrets of space, and of the Universe, but what you say is true. Light is due to the nature of space," replied Torlos, after a consultation with his scientists, the men who sat about the great table. In the meantime, Arcot had translated to Morey.

"How fast does sound travel?" asked Arcot.

"They ask in what medium do you mean?"

"How fast does light travel? In air? In glass? Is then, the speed of light unalterable? Suppose that I can alter the speed of light, make it greater, can I not then go faster than light in normal space?"

"They say this is true, but space is unalterable, for it is empty," interrupted Torlos again.

"Ask them, then, if they know of the curvature of space?" Arcot became worried for fear his explanation would be unintelligible, for unless they knew his terms, he could not explain, and it would take a long time to teach them. At any rate they knew of the Island Universes—that they were very far away.

"They say that I have misunderstood you, space is not curved; it is emptiness. How could emptiness be curved?" Arcot turned to Morey and shrugged his shoulders.

"I give up, Morey—it's a bad case. They say space is emptiness, and emptiness can't be curved. I can't go any further.

"They cannot understand what I would tell them. We have learned secrets of space that they do not know. I am surprised that they have not solved these problems and learned of the curvature of space. How do they know then of the speed of light, and its limiting effect on motion?

"They say that you do not know more than they have learned, for surely they know that the speed of light is the limit, and in emptiness it is greatest, and that they learned of this law by experiment with space ships at very high speeds, and by experiments with the smallest particles of electricity,"

The scientists were looking at Arcot now in protest; they felt he was trying to foist something on them.

"Where, then, do creatures such as I live. They have explored this system? There are no such people? Then I must have come from some other star? How? If they will not accept my explanation, what have they to offer? Also, can they say I know no more? Watch, ask them to do this!"

Arcot waited till the message had been translated, then he rose gently into the air, and hung suspended. He used his power unit to move slowly about, then darted high into the great room. Then gently he dropped to the ground.

"Why not show them the invisibility?" asked Morey.

"Don't—keep it for a surprise—they are beginning to get ugly. We need the information they can give us, so let's be at least as persistent as possible, but save the invisibility for the last. It may be necessary."

ARCOT drew his molecular ray pistol now and asked, through Torlos, for a chair. This was brought, and Arcot lifted it high into the air on his molecular beam; then Morey drew his cosmic ray beam and turned it on the metal chair. In an instant it was glowing white hot, and had melted. An instant after it was a fiery drop of metal in the air. Morey shut off his ray, and Arcot held it there till it had cooled. Then he let it down to the floor. That the scientists were greatly impressed was obvious, but the Emperor was now talking eagerly with the men about him. For many minutes they talked together, and said nothing to Arcot or Morey. Torlos stood awaiting their message. Arcot trie to communicate with his ship, but could not.

At last they turned and spoke a long message to Torlos. Then the Emperor called out. Some of the guards moved inside the door. Two more followed, and another pair, as Torlos thought his message to Arcot.

"Show no emotion!" he warned as his beginning. Arcot was surprised at this message, but obeyed its command.

"I have been listening to them as they spoke. The Commanding One wants your weapons. Whatever the scientists may say about the possibilty of your trip, those weapons are deadly. He wants them.

"I am not of this world, but of Nansal, sent here many years ago as a spy. I have served in the Satorian fleets for many years, and I have gained their trust. I am telling you the truth, now, friend, as you will soon see.

"These people are going to follow their usual line of action, and take the most direct way toward their end. They are going to attack you, believing that you,

despite your weapons, will go down before superior numbers. See, the guards are coming already!

"I must go with you now, for otherwise I will be detected, and I want to return to my world. These people are so treacherous that our people can no longer trust anyone, or anything they cannot know about. That was why they attacked you.

"These men are about to attack. They are awaiting the answer to the question of how many men there are on your ship and certain other things. I said I didn't see them all.

"Can you signal your ship? Tell them to come and break down that wall. It opens into the city. From there we can leave. But it must be quickly done, before their ships get here."

"We cannot call the ship," replied Arcot, his face calm, his heart beating violenty. "They are shielded by these metal walls. We can open that wall, however. Wait, I will speak with my friend."

"No expressions, Morey, they are planning to jump on us. We can't reach Wade and Fuller till we open that wall. There is going to be action here right swiftly, so you open that wall, and I'll pass my cosmic pistol to Torlos. We can go into invisibility, and my apparatus is powerful enough to carry us both, as well as lift us both. We can act quickly, and escape before they know where we are. Get ready for some action of some sort." He turned to Torlos.

"He is ready. Your Emperor is getting nervous. We are ready soon. I will rise into the air above your head, and you will take my legs, and we can float. I will make us invisible. You will use the ray pistol that heats. Do not use it while we are invisible, as it will make us visible again." (Arcot meant that the light produced, would, like a flashlight at night, make the user visible.) "Remember it is deadly. Kill no more than necessary."

He stopped, and Torlos turned to his king.

But it was too late. Already the order had been given, and the guards were leaping toward them. Quick as a flash, Arcot passed Torlos the ray pistol, but already the first of the guards was on him. Too late to use the pistol! Torlos seized the man by one leg and an arm, and tensing his huge muscles, hurled him the thirty feet against the Commander. He hurled him with such terrific force that both were killed instantly by the impact! He turned and gripped another, long before his first victim had landed. Indeed, he was far stronger than these men! This man he grasped in one hand and hurled him toward the advancing guards, for already one had gotten by him and reached Arcot! Arcot, strong as Earth men go, dealt the fellow a terrific blow on the jaw that nearly shattered the bones of his own hand. The man's head jerked back and he fell unconscious, for the iron bones still did not protect the delicate brain from shock. They transmitted it even better. Morey was also in action and he, too, realized the futility of trying to overcome these men by mere wrestling, and their muscles made them immune to any blows that the Terrestrian men could deal, save on the point of the jaw, so he struck another as Arcot had struck the first. They were too busy now to be able to escape. But now Torlos had gripped a man more securely, and as from a great catapult, he hurled him thirty feet away. The man landed with a thud and lay motionless for a moment. Then he was up and leaping back. They could not use their pistols now. Their own men protected the strangers.

Torlos was in action again. He drove his hands like pistons now, and he had seen the success of the comparatively weak Terrestrians, and imitated their blows with deadly results, for every man he struck went down forever. Nature had given them mighty muscles, and mighty bones, but the brain was still delicate and it was killed, where the tough body could withstand the blow. But they could never win free. Already the alarm was spreading. Suddenly he grasped two men under his arms and crushed them heavily together. The brains were numbed by the shock, although the iron arch of the skull was unaffected. Then, one by one, using them as ammunition, he hurled them across the room, smashing back the men who struggled to attack. His monstrous ammunition he hurled with the speed and tirelessness of some giant engine of war, and as he hurled the two he stooped and gathered the forms of the others he had put out of action, and they followed the others.

At last he was free for an instant, and just as one man gave a tremendous leap and sprang nearly twenty feet, and landed full on him, he drew the pistol Arcot had given him. With one giant arm he caught the man and flung him away, ere he had a chance to reach the floor. And now, with a swift motion, he turned the pistol, and as Arcot taught him telepathically, loosed its energy. In a moment every man in the room was dead, save Arcot, Morey and the giant Torlos.

BOTH Arcot and Morey had nearly broken their hands, but they were still alive. They had had no chance to use their weapons. That they had been able to defend themselves in man-to-man combat was indeed a tribute to the development of these men! Luckily, they found these men knew nothing of boxing.

They were free now, temporarily. Arcot drew his molecular pistol, and a moment later the entire wall was flying inward, to fall a mass of masonry and twisted steel, on the floor of the room. He at once called the ship.

"Wade—couldn't communicate—metal walls—they attacked us—treacherous. Torlos warned us. We have torn out the wall; come quickly, and we will pile in. Step on it; they are coming—Morey—ray that wall down over the door so they can't get through—they will attack you soon; get moving. We will bring Torlos. Don't come into the building—just hang outside. We will board in an instant."

He stopped and turned. Suddenly the room rocked under an explosion, and the debris Morey's ray had thrown over the doorway was blown away. A score of men leaped through the gap before it had settled. The dust was still in the air. Instantly Torlos turned his ray on them, they fell dead.

"In the air, quick!" called Arcot. He turned on his machine and Torlos gripped his leg as he rose. Another group of men leaped over the debris, and Morey's ray flung them back at a far higher velocity. They were silent, but he heard heavy crashes and groans, as they shot back on those behind. Then they were in the air, and Arcot snapped on the "invisibility." He disappeared, just as Morey did. At the same moment, more of the courageous, but foolhardy, Satorians leaped through the opening and looked bewildered as they saw no one moving. Arcot and Morey and Torlos were invisible in the air above them. They looked wildly about, but there was no one. Just then the shining bulk of the *Ancient Mariner* came into view. They drew back behind the wall and sought shelter. One of the men began shooting his little gun at it. The foot thick walls of lux might as well have been struck by some buzzing mosquito!

"We're coming—invisible—don't use the rays till we are aboard. Open the airlock," said Arcot into the radio. In a moment they had come over to the ship, and were in. The heavy door closed behind them and they settled to the floor. In an instant they were vis-

To his amazement, he saw the entire city suddenly leap into the air and flash out into space.

ible again; then Arcot and Torlos sank to the ground and Torlos lowered Arcot to the floor. He stripped off his power suit, calling to Torlos to follow. Already Morey was out of his suit and in the power room. In an instant Arcot was dashing up the stairs and into the control room.

"I'll take controls—Morey; rear molecular; take Torlos with you. Wade, forward molecular; Fuller, bow cosmics."

In a moment they were at their posts. Suddenly there was a terrific explosion and the titanic mass of the ship, a quarter of a million tons, was rocked by the explosion of a bomb of some sort one of the men in the

building had thrown. It seemed Morey had already shown Torlos how to use his cosmic ray, for an instant later the stabbing beam reached out, and the great tower, from the floor to the roof, suddenly leaned over and slumped as the entire side of the building was converted into a mass of glowing stone and molten steel. Then it crashed heavily to the ground, a half mile below.

But already there were two score of the great battle ships rising for battle.

Arcot snapped the ship into invisibility. The battleships suddenly halted in their wild rush, and looked, amazed, for their opponent.

"I think we had better be moving. We will have a sweet job breaking through that magnetic wall, but we have to do it. Oh, by the way, we can't let a magnetic ray touch us now, for it would kill Torlos. That is one disadvantage of iron bones. Sorry—I'll explain to you fellows later. We're busy!"

Torlos made a mistake. He turned a cosmic ray down and picked off a battleship. It fell, a blazing wreck, but the ray did two things. First, it revealed their presence by its shining column of ionized air, and second, it touched a great building behind the battleship. It fused most of that building, and did a thorough job of destruction on the one behind that. But it also established a conducting path between the invisible ship and the mass of the planet. Now, the apparatus was not designed to make a planet invisible, but it did make a noble effort, and blew out one of the tubes. The ship was at once busy and visible. The battleships of the Satorians saw to it that it remained busy—so busy that it was forced to remain visible. They had only one bank of invisibility tubes.

Arcot was diving the ship, twisting, shooting up, and always the rays of pale light were reaching out from the *Ancient Mariner* to touch the battleships. Where they touched, those ships went down in wreckage and fell on the city. They were certainly showing a good account of themselves, to say the least!

And always Arcot was working his way toward the magnetic wall and the base of the city. There were no people on the roofs of the city now!

Suddenly, giant pneumatic guns from below joined the battle. They hurled huge explosive shells. They exploded in the air, so the fragments even did not fall on the city. They did, however, accidentally hit one or two of their own ships. The *Ancient Mariner* was hit twice. Each time the ship was staggered by the mechanical force of the explosion, but the foot-thick armor of lux metal laughed at it.

The magnetic rays twice touched them, and each time Torlos was thrown violently to the floor, but the ship was in their influence for so short a time that he was not injured. Torlos more than made up for his hurts with the ray he used. And Morey was no mean rayman, it seemed, judging from the work he was doing.

Three ships attempted to commit suicide in their efforts to kill the Terrestrians. They were semi-successful. They committed suicide. In trying to crash into the Terrestrians, they were merely caught on the beam and thrown away. Morey actually developed a very successful use for them. He succeeded in using them as bullets, throwing them about on the molecular ray till they became too cold to move.

Then suddenly the magnetic wall was before them and they were near the base. Before them there was one of the low power-houses. A molecular beam reached down and the black metal dome sailed high into the sky. The magnetic wall was broken. An instant later the *Ancient Mariner* had shot through.

IN a moment they would be away. Torlos realized this, and having seen how to operate the molecular ray projector, he reached over and took the controls from Morey, pushing the Terrestrian aside.

He did not realize the power of that ray. He had never seen Morey use it at full power, and he did not know that these projectors had thrown a sun into a blazing furnace. He only knew that it was destructive. They were several miles away from the city when he turned the projector on it, full power. He had used the ray directed up. To his amazement, he saw the entire city suddenly leap into the air and flash out into space, a howling meteor that flashed dark and small as it shot through the clouds. Behind was a deep hole in the planet's surface, a mighty chasm, its walls, miles deep, lined with dark granite. He looked behind him, amazed, and horrified.

"Lord! Torlos used the full power of the ray!" called Morey in awed tones. It is quite a different thing, this pulling a sun into another and seeing the titanic masses burst into cosmic flame; it is impersonal, but when an entire city flies off into space, a wild planetoid, that is different!

Arcot turned back, slowly now, and they sailed over the spot where the city had been. They saw a dozen or so battleships racing from them, ships that had been outside the city when it happened, racing to spread the news of disaster. Arcot maneuvered the ship over the mighty pit, and sank slowly down, great searchlights lighting the dark chasm. Far, far down he could see the solid rock stretching away.

Then he rose and sailed quickly up and out, above the cloud layer, into the bright light of the great yellow sun, out from the grey world, and into the world of light, and a sea of grey misty clouds.

"Morey, take the controls, and head out into space. We have to take Torlos home, and there is a lot I want to ask him. I will speak—or think, with him. I want to ask him why he did that last stunt. Wade, you put a new tube into the invisibility, will you? We had better go on the molecular motion until I have found out what I want."

Arcot left the cabin and retired to the library with Torlos. Wade and Fuller followed.

"I'll explain to you just what happened back there—it was plenty!" Arcot smiled, and looked ruefully at his bruised hand. He had stopped on the way back, and fixed it as well as possible. Arcot told as rapidly as possible what had happened in the Audience Room.

"Hmm—they were a nice bunch of people to deal with, weren't they? Well, they tried to get the whole cake and lost everything. We were going to give them plenty, at any rate. But what sort of a war is this that Torlos' people are carrying on?" asked Wade.

"That's the question which I intend to settle. We haven't had a very good opportunity to listen to him yet, you know. About the time we learned he was a spy, a little private war broke out, and we were rather occupied," replied Arcot. Now he turned to Torlos. It was obvious that the idea of destroying a city, as Torlos had done, was very distasteful to him.

"Torlos, why did you force Morey to leave the ray and then destroy the city? You certainly had no reason to kill all the non-combatant men and women and children in that city? And why, after I had told you that you must not use the rays when we were invisible, did you use your ray on that battleship? You made our invisibility break down and destroyed a tube. Why did you do this?"

"I am sorry, man of Earth," replied Torlos. "I can only say that, for I did not fully understand the effect that the rays would have. I would not have done so but for one reason. In the first case, I did not know for

how long a time we might remain invisible; the thing has been accomplished momentarily on our world, before this, for a mere fraction of a minute, and I feared we might become visible soon, and I knew that we must become visible to use the rays in getting through the magnetic wall, and that ship worried me. That was one of their newest battleships, and they are equipped with an invention they stole from us, as they have stolen every other important invention. They have men in every laboratory and they are always stealing the things we work out, and removing the men who invent it. It is unfortunate that the two races are so similar.

"What the invention is I do not know, only I have heard that it is utterly deadly. That ship was equipped with it, and I wanted to make sure we were not attacked by it. I knew that you could withstand any efforts of the magnetic ships if you lived through the magnetic ray of a power station, and I wanted to make sure you got back to my world.

"That was why I turned the ray on that ship from invisibility. They have only one or two completed as yet, but by the time we reach my world, they will have completed many of them, for their factories are in production, and it will take two weeks for us to make the long journey now.

"But I forgot—how long will it take you?" he asked, suddenly remembering the speed of this car.

"As long, or as short a time as we wish. Finish your story. We will land on your planet inside of fifteen minutes."

Torlos gasped.

"I did not mean to destroy that city," he continued. "I meant only to tear out the factory that made those battleships. I wanted only to destroy those machines. I had no conception of the power of that ray. I was as horrified to see that city disappear as you were. I wanted only to protect my people.

"But," Torlos smiled bitterly, "I cannot say that I had no provocation for destroying that city and all its people. However, I had no intention of doing it, Earthman." Arcot knew he was sincere. There could be no deception when communicating in this way! How he wished he had used this method of direct communication with the Emperor. The trouble would have been stopped quickly.

"You had no conception of its power, Torlos. You still do not have any idea of the real magnitude of its power. With the rays of this ship we tore from its orbit a sun 200 times as large as the sun that lights this system, and flung it, blazing, into another giant of space, 250 times as massive as this sun. What you did to that city, we could do to that planet. Do not tamper with things you do not understand, Torlos. There are forces on this ship that would make the energies of your great battleships seem weak and futile. A billion times faster than light we can race through the ether. We can tear apart the atoms of matter, and leave, instead, only separate protons and electrons. We can rip apart the greatest of planets. We can turn the hurtling stars, and send them where we want them. We can curve space as we please, we can put out the fires of a sun, if we wish. What you looked at in surprise, as small, and seemingly weak as we ourselves, contains in its instruments the forces that will loose the vastest of nature's energies and will swing stars, planets, suns, or atoms about as it chooses! Torlos, respect the powers of this ship, and do not release its energies, unknowing. They are too great." Arcot paused. Torlos was gazing in awe at the man who had just told him of the powers of this seemingly tiny ship. He had seen the engines, small, apparently futile things beside the solid might of the giant engines of his ships—but he had seen great explosive charges that would split any ship he knew open from end to end, bounce harmlessly from the smooth walls of this ship. He had seen it destroy the fleet of the magnetic ships that had formed an impregnable guard about the city of Sator, the capital of Sator.

THEN he himself had touched a button—and the giant city had flown off into the air, leaving behind it only a screaming tornado and a vast chasm in the blasted planet. He could not appreciate the full significance of the velocity Arcot had told him of. He only knew that he had made a bad mistake in underrating the powers of this ship!

Arcot translated the things Torlos had explained to his friends and told Morey about it, going up to the control room. They were now several million miles from the planet, and now were merely coasting, weightless, toward their destination.

"I rather thought Torlos had some reason for what he did. He had picked out one particular battleship with his ray projector and kept following it, not using his ray, just keeping it covered," ventured Morey.

"How did you know? You couldn't watch him when he was invisible, could you?" asked Arcot in surprise.

"Pssst—I kept my hand on his ray director, so I knew what he was doing. I would have stopped him from using that ray, but he had followed it for so long without using it, I didn't expect him to discharge it. It was a big surprise to me when he finally did use the ray.

"But while I was alone here I kept thinking about that man's strength. It still surprises me. Your explanation of iron bones makes it more comprehensible, but still—did you notice how he threw one man a full twenty-five feet—and with one hand. That was the only time I saw him give any indication of strain. All the rest of the time he was merely smiling, a smile that made me like him even more! Lord! The way he tossed those men around! It seemed that only a machine could have done that! But then, he comes nearer to being a machine than anything else I ever saw! The strength of the man! He is far stronger than the men of this world we just left, that is certain. Of course, having been born and raised on a heavier planet, would account for part of it, but not so much! And he seemed tireless. He threw those men one after the other like ammunition from an old machine gun! He threw the first as violently as the last. Apparently his muscles felt no fatigue!

"I have developed a little theory to account for all that, and several other facts I noticed. When I got through there I was dripping sweat. That hot, moist air was almost too much for me. Our friend? Cool as ever—if not more so. I noticed that he was not breathing heavily any more! During the fight I noticed, in the few seconds I could spare, that his abdomen was evidently the muscle with which he breathed, like a man. Although man has a flexible chest, he never uses it save under the most violent exercise. Ordinarily he breaths with his abdomen. Only a woman uses her chest. Torlos was breathing heavily, deeply and swiftly, not shallow like an ordinary panting breath of a runner, but deep and full, yet faster than I can breathe! I could hear his breath, despite his swift movements and the noise of the battle. After it was all over he was not breathing any more heavily than now! He started breathing heavily *before* the fight, and ceased when the fight was over.

"Now, a man can fight very swiftly, and with tremendous vigor for ten seconds, putting forth his greatest efforts, and breathe only once or twice. For two minutes, at least, he breathes only slightly more heavily than normal, or is forced to, although he reasons

that he should breathe heavily and does. But after the battle, he cannot stop breathing heavily. Of course, as he starts, he is running on stronger energy. The blood is full of dissolved sugars, which furnish the reducing agent, and some high oxides that are the oxidizing agents. He really gets into 'oxygen debt' when he uses these oxides to work his body, for the short time that the body is 'shifting into high,' and then the blood stream supplies the necessary oxygen. But, after the work, the blood must supply more oxygen to build up these oxides once more. Therefore we must breathe heavily after working. But Torlos didn't. Why? He did not get fatigued. He was able to work steadily.

"It seems obvious to me that no chemical engine, the size of Torlos could do that much work, without getting rid of the tremendous volume of carbon dioxide by means of some special mechanism. The oxygen couldn't be supplied; the amounts of water created would dilute the blood. The wastes would accumulate, unless that engine had been very specially designed to be used at that rate for long periods of time.

"The human heart is such an engine. There is a muscle that has been designed to do a great deal of work continuously. Fatigue, of course, is nothing but chemical wastes accumulating. It is a chemical. To get rid of this fatigue and the consequent tiredness, and make the heart able to work continuously, the Lord has provided it with an apparatus that will remove these poisons so swiftly it never gets tired. A fast runner is one who has accustomed his legs and muscles to building up a very special mechanism that will remove the poisons more swiftly than is natural for the human body. The result is that he can work thus as a higher rate than can an untrained man.

"My point is that no man could have done that work, and still breathe lightly. Nor could he have done that work without becoming fatigued. As you pointed out, he did not get tired, and, as I have tried to show, if he were a chemical engine, that is, as we are, he would have had to practice for this battle, would have had to do that much work for many, many months!

"The conclusion is obvious. The man is not a chemical engine. Very well, what is he?

"I'll admit that I got some of the information for this theory from his brain, but most of it was derived from my own deduction.

"You know what the Brownian motion is, do you not? Well, you sure are a fine partner for me! It is the thing that really did most for the molecular theory of heat! If very small particles are suspended in a liquid, a gas, a solution, the particles, when viewed under an exceedingly powerful microscope, will be seen to jump about violently, as though they were alive, moving first in one way, then in the other, then in a new direction, jumping about with great speed. A biologist named Brown first discovered this, hence the name. Also, I am surprised at you—don't know that Einstein, the great mathematical investigator of space, won his first Nobel Prize for his explanation of that phenomenon.

"HIS explanation of the thing was mathematical, of course. I wish you'd get courage and dig it out—I never tried following it. Here's the idea, though. Suppose we lower a plate, say one inch square, into a tank of oxygen. The laws of probability, which apply perfectly when there are so nearly an infinite number of chances, say that if 10^{555} molecules hit it on one side in one second, then 10^{555} + or — a few billion, will hit it on the other side. The result is zero, and it stays where it is. Suppose it is only one billionth as large. Now the thing is so small that there isn't room for more than a few hundred molecules to hit it at any time. Now, if we threw a set of dice 10^{555} times, we would get just as many deuces as elevens or sevens. But if we throw the dice only 100 times, this isn't so apt to be true.

"Make the plate still smaller—the number of throws still less. Suppose the plate is only 1/100,000,000,000 as large as originally. Then we will have only a few molecules striking it at any one time; we throw our dice only a few times. Now if we throw our dice a few times, the chances of the sides turning up even numbers of times are slight. In the molecular analogue, if we allow only a few chances—a few molecules, there is a fair probability that more will hit one side than the other. Result? The little plate—the tiny particle, will move in the direction it is being driven by most molecules, until more hit in front than hit behind. Then it will go the other way.

"It is doing, on a small scale, what we have made a large and expensive machine to do. It utilizes heat energy to drive itself, for the molecules are moving because of heat energy.

"Heat is the sum of all energy. All energy tends toward heat and there is heat everywhere in the universe. Now, as we know, there is not food everywhere in the universe. If a creature could use that low grade heat energy, that most omnipresent of energies, what a hardy species it would be!

"Now the particles that are needed for the Brownian movement are of the order of size of a living, single cell. The energy is available to a living cell."

"Oh!" said Morey, amazed. "You mean that Torlos uses heat?"

"Exactly—and he lives on heat. His fuel is heat. I have noticed that he seemed almost cold-blooded. He is! His body is at the temperature of the room at all times. He is, then, reptilian in a sense, but he is vastly different from any reptile that Earth ever knew. He eats food, but that food is needed only for replacement of dead cells and for the small amounts of fuel needed to run his brain. His brain alone needs fuel. That is the only thing open to chemical fatigue, and it has been shown time and again that the brain can work indefinitely, if the body would only stop getting tired! The twenty hours of day would be very hard for us, but there is no trouble for them. They probably sleep once every two days. They have no wastes to get rid of, save the slight wasting of the dying cells, the brain energy wastes, and the little work of replacing the worn cells. The heart, the muscles of lung and arms and leg—they are all using the energy of the air that abounds about them. He breathes—certainly—he breathes to take in heat as he uses it. And just one heat unit in the English system is equal to 778 work units! No wonder he can do the things he does! Lord! He is not as close to the snake as he is to the machine! It, too, takes its temperature from that of its surroundings. A man, a brain, directs it, and it works for him, using some other source of energy. A brain directs his body, and the body does the work, using the heat of air to work. What an admirable system! No wonder he can do the things we saw! Why, he could have continued that fight for forty hours or so without a sign of fatigue! Fatigue is as unknown to him as cold weather. He sleeps only to allow for replacement of worn parts. The world he lives in is warm, it is upright on its axis, and there are no seasons. He cannot live in the Arctic, of course, but he is obviously the ideal form of life for the tropics."

As Arcot later found, he was mistaken in only one point. His diagnosis had been perfect up to this last point, but here he was wrong, but he had little reason to expect that! These men, on necessity, could develop an organ which ordinarily was of small size, a

peculiar mass of cells in the lower abdomen which could absorb food from the bloodstream and convert it into carbon dioxide, water and heat. Then the men could live very comfortably in the Arctic zones. As Arcot put it, they carried their own heaters. Then, however, their vast strength was limited, they were forced to eat greater amounts of food, and they were subject to fatigue.

"I can see now how they can have such tremendously powerful muscles. At first it was only the bones that bothered me. Then when I began considering them as pure chemical engines, I saw rather difficult points. That makes it obvious. No wonder he could throw the soldiers about like that! What wrestlers those men would make! A ringside seat would be highly undesirable! Imagine those huge muscles straining—Lord!"

"Well, in the meantime, I am going back to confirm my suspicions," said Arcot, diving back to the library.

Wade and Fuller were engaged in trying to read Torlos's thoughts and to communicate with him. As Fuller had specialized on Transmission of Ideas, he had been able to make Torlos acknowledge acceptance of an idea; but neither was able to completely grasp Torlos's ideas.

"Say, Arcot, I thought telepathy was a universal language. This man doesn't get our ideas at all! And we can't make out some of his. He seems to be thinking 'nourishment,' or 'food,' and I found out he meant 'hot'!" laughed Fuller.

Torlos smiled, and turning to Arcot, with whom he had learned to communicate readily, he said, or thought, "These men have not your learning. They cannot ununderstand my least thought!"

"We are not made as you are, and all your thought ideas are different. When you meant that quality which causes pain on being touched," Arcot thought of a flame, "they understood you to mean food. I have but just decided that even our muscles are different from those of your people. Do you not breathe that you may be able to move, and use the heat of the air?" asked Arcot.

"Of course! Don't you? How is it that you are so warm, even in this bitterly cold room?" asked Torlos in sudden surprise, as he felt Arcot's warm hand.

"We are made on a different plan. Our muscles burn foods and the energy is converted into motion."

"Why, that is almost impossible!" thought Torlos in amazement. "We have never been able to get better than 30 per cent. of the energy out of any such machine that we put into it! And even then the machine was such a great, clumsy, clanking affair, that we were forced to throw it away at once. How can you use such a curious form of energy?"

"How indeed? We do not know ourselves. We know it is an exceedingly inefficient system, but we have been so built. That is one reason why you are so vastly stronger, and your iron bones give another reason. Ours, as I have explained, are of stone."

"Stone, and a soft, porous stone at that! Indeed your brains must have been active to overcome such terrific handicaps, when all was a struggle for existence."

"It was not so bad as that, Torlos, for there are no such creatures as you on our Earth. All creatures have the 60-70 per cent. inefficient muscles that we have, and the same soft bones.

"But man is the one creature that has no outstanding weapon of offense or defense save his brain. He is slow. Almost any creature can outrun him. He is weak. Creatures half his weight are more powerful. He has not great teeth with which to protect himself; his claws are meager burlesques of weapons. His eyes are probably the poorest in the animal world; his ears are useless as warnings; his nose never knows when danger is near. He certainly seems a hopeless misfit. Even his hide is poor protection against cold or heat or danger. He has no armor, such as the armadillo wears, or the tortoise.

"Yet man is found over all the Earth—and now, man will be found over all the vastness of space. With his machines, he can outrun, outfly, outswim and outdive any creature that lives or has lived. With them he is stronger, taller, faster and more deadly than any creature that ever lived. With his machines he could hurl to defeat the mightest creature that lives. He can destroy at a distance; he can lie back in perfect safety and destroy his enemy by merely pushing a button, he can go in a machine, directly to his enemy, and examine it, hold it captive, and make it obey his will. He can see farther with his telescopes, and smaller with his microscopes, than could any other creature. He can see around corners and through walls with his television, and he can hear sounds a hundred million miles away, or a billion miles away with his radio. He can lift any load that he wishes, and now, as we know, he can move the very stars in their courses. He even changes the forms of the animals he deals with. In all the universe there seems but one thing he cannot manage."

"What is that?" asked Torlos curiously, marveling at the mighty record of triumph over obstacles that must have been almost insurmountable.

"Himself," replied Arcot, smiling. "He can manage the animals, the matter of Earth or any planet, or the sun. He cannot control the atom. He bends electricity to his wishes; heat and light, X-rays, cosmic rays, radio, molecular rays, sound, gravity, all yield to his desires and the forces of his machines. Yet he cannot always control himself. We have had wars and I fear that we will have wars in the future—wars in which whole worlds will be annihilated!

"It is true, men of our world can do much, but much that you control, we know nothing about, I can only learn of their nature from you. We cannot control ourselves. Even now we are at war."

"What's the communication about?" broke in Wade.

"Philosophy. You wouldn't be interested," grinned Arcot, "but we are going to start finding out about the present unpleasantness.

"Torlos, we want to know how this war started. Has it been continuing long?"

"This war has been continuing for many hundreds of years. It is history that will be of interest to any world. It is a history of persecution and rebellion.

"Hundreds of years ago there were two races of men in the system of our sun. One race lived on Nansal, and it was farther advanced than that race of Sator, which alone of the planets was left habitable. The men of Nansal were almost exactly like those of Sator. Those men of Sator, however, were treacherous, lying, deceitful. They were somewhat smaller than our men and they were lighter in color, for their world is always sunless. It is always a dull gray, as you saw it. Our world is usually lit by the sun and its warm rays tan our skins to a darker color. Our children have always been brought up in a strict training of truth and according to an ideal we know as 'norus'," and Torlos pronounced this word, "which is the embodiment of our ideas of those things which are right. It was a thing developed long ago, almost before history was begun, when there was a certain king by the name of Norus, who gathered about him a group of men who tried to develop and spread his ideals.

"The men of Sator have been brought up on a different system. It is a system of cunning. In their idea, cunning is right. The man who can plan most cunningly is the man who deserves to live. There are

restrictions; they have loyalty. It may seem incongruous that these can exist together, but they do. And they are peculiarly loyal to their country—their world.

BUT the first planetary exploration was carried on by the Satorians. Their researches had led them to the secret of the magnetic projector. They had many things that we did not have, but there were many things we had that they lacked. Our discoveries were, in a large part, commercial, and tended toward making our lives more comfortable. Maybe we were growing weak. I do not know. The Satorians had developed many things with which they could fight, as well as commercial discoveries. They had but just made their world one nation, when at last, with the development of the magnetic ship, all men went down before the nation which had developed it. Then they came to our planet.

"They traded peacefully with us for many years, while their spies tested out our institutions and learned our secrets, the few that we did not gladly give them. These few were trade secrets in the main, only certain ones would have been of importance to the Satorians.

"The Satorians, in return, gave no secrets of their processes. They refused to disclose the secret of the magnetic beam and the magnetic ship.

"Finally there were a few of the courageous Nansalians, who realized that this might mean danger to them. There were three men, students in one of the great scientific schools, and these men realized that this situation should have been studied. There was no law prohibiting the men of Nansal from coming to Sator, but it seemed that Nature had raised a more impenetrable barrier. All Nansalians who went to Sator died of a mysterious disease. A method was found by which it was possible to fumigate a man so that he would no longer spread it, and this was used on all Satorians entering Nansal, but an entire world cannot be thus treated. Nansalians could not go to Sator.

"These men had an idea. They studied carefully the ways and speech of the Satorians. They learned to imitate the slang, the idioms of three of the men they intended to replace. Three navigators of the space between the planets, they were. Finally they decided they were perfect. They had bleached their faces. They had chosen exceptionally large men for their doubles. Then they acted. On one trip three of the men that went back were Nansalians.

"It took them six years to get back. They had to wait till they were again detailed for a trip, but in the time that had passed they proved two things. The first was that the 'disease' that was so deadly to all Nansalians, was probably a poison unknown to Nansal. Or perhaps the germs didn't penetrate the disguise. At any rate, they lived, and they brought the secret of the magnetic ship back with them. They had passed the tests of the men of Sator for six years. At last they had returned.

"But that was not all they brought. It was common knowledge on Sator that their leaders would soon lead them across space, to settle on the land of sunlight and clear air, cloudless skies, where they could see the stars of space every night. They were waiting only till they had built up a larger fleet, and until they had learned all they could from the Nansalians. Also, they wanted more of their supply of the most precious of metals.

They attacked three years after the men had returned, and in the meantime, Nansal had secretly succeeded in building up a fleet of the magnetic ships, but it went down quickly before the vastly greater fleet of the Satorians. Their magnetic rays were deadly; they killed every one they struck, for they attracted every man, and then, when they passed, he was allowed to drop, perhaps hundreds of feet. Their buildings, despite their steel and iron frames, went down, crushing hundreds of others. They practically depopulated the world of Nansal, as the three men who had gone to Sator had said they would. They had mode the correct steps, they had made great caverns in the hills habitable, and there they had built laboratories, factories, and had established a little city far under the ground, where the Satorians would never find them.

"But many people did not reach these caverns, and they were destroyed.

"Enough men had reached it, however, and most of these were the best, the strongest, the healthiest, the most intelligent that Nansal had. They lived here for over a century, while Nansal was overrun by the conquerors and the cities they had built were rebuilt by the Satorians. This was before the day of the magnetic shield. That is quite a different thing from the rays and the propelling device. On these beams the ships went from planet to planet easily, you know. They do not vary with the distance, but are as strong at one end as the other. They are perfect beams. One merely points them at the planet, and turns on their power. When the beam reaches the planet, the attraction for the iron core of the planet makes the ship move forward. Soon they have sufficient speed and coast on, as we are now doing.

"But the ray that built up the shield was new. That was developed in that century, by one of the men who had originally gone to Sator. With it as a protection, he built a city in the mountains. For many weeks it was not discovered. Then at last a Satorian scout found it, for ours is a big world and he reported it. Soon a battle fleet appeared. But the city spot was already impregnable. The great domed power stations were already in operation, and they were anchored too firmly to be drawn out of the ground. The ships could not destroy them, nor could they enter the city with the ships, for the sudden weight of the men was at once fatal. They could not enter, nor could their rays, for the magnetic shield acted on them also, and bent them down so they were unable to penetrate the city.

"The first city was a great munitions plant. They built factories there, and laughed, while around them the armies of the Satorians raged impotent. Explosives the Satorians tried, but the domed construction made them impossible to destroy in this way. Men could not enter on foot. And the men from within the cities had developed a means of causing sparks in any conductor that appeared in the magnetic wall. The result was, that no explosive could get through without being exploded, unless it were in a non-conducting container. It took the Satorians a long time to find that out." Torlos chuckled as he thought of those men raging impotent about the city.

"In the meantime the Nansalians made their fleet. It was a great fleet of ships, and the Satorians were also at work. But the Nansalians had a new thing; they had developed a way of projecting the magnetic wall. This they used and could cut the support from under their enemies. The rays were thrown to one side, and the ships, which were no longer supported, crashed. The city stations projected this magnetic wall, while the men outside fought with the rays.

"Also, we had means of making the ships very rapidly. The Satorians had decided that we had been wiped out." Torlos laughed again.

"It took us nearly thirty years to convince them that not only were we far from being wiped out, but that they were in imminent danger of it themselves. Their cities had never developed the protective ray. Their people fled back to Sator. The cities we wiped out. And in the meantime they had learned the secret of our magnetic wall. Their cities were now protected.

There were three left on Nansal. It was a static condition. We could not wipe them out; they could not attack us. We had six cities then. And we were rapidly expanding.

"Their fleet was so concentrated now that we, with our magnetic beams, could not attack. At first we had been able to creep up by night, and wipe out a large portion of the cities, but now they had means of detecting the action of our rays, and we could not steal up on them. Neither could they attack us thus, however. But their fleet had the advantage now, and they were constantly attacking, and our fleet was wearing thin.

"We developed the next surprise. We set down a barrage of a gas that drowned them in their mountain valley. They were practically destroyed in those two cities.

"They tried to reciprocate, but we had expected that, and all buildings had been made air-tight, and the air was passed in through giant purifiers. They, too, were protected on the next attack. But we seemed winning. Then they built three more cities. We became desperate. The war was concentrated on our world. They had developed shells that would penetrate our cities and burst. But we had done the same, of course. It was so deadly, that, like many other things, neither side continued it. We merely decided not to do that particular thing."

ARCOT had been translating. Wade exclaimed in surprise, laughing at the idea of two forces, each trying to kill off the other, agreeing thus to be careful!

"That is not so surprising!" said Arcot. "How about the scrap they had in 1918—it started in 1914, didn't it? Did you know that they did not drop gas bombs from airplanes? Why? They were both afraid of it. They knew that if they did it, so would the other fellow, so they didn't! And how about killing the general? There are plenty of men willing to commit suicide for their country. How easy to send a man within rifle shot of the general! They have spies in plenty, why not have one kill the general and cripple the forces? Why, that's no fun—because then the other general, who is directing the opposing force will merely have to make out his will. He is next on the list. You can win a game of chess by killing the other fellow, but that's no game, his friends would kill you—and so on! And remember, they talked about that famous non-existent ideal 'Civilized Warfare'! Legalized Murder too—and they had a lot of need for it. Some of those criminals should have been shot. They might get a few innocent persons—but the great good would certainly more than make up for it—and—'Civilized Warfare'!"

"You win Arcot—you're right, and I'm wrong, as usual," said Wade grinning.

"Just what do you mean by that?" asked Arcot, looking at Wade skeptically.

"Oh," replied he, with a nonchalant gesture, "take it as you will."

"Well to get back—" said Arcot, turning to Torlos.

"But the conditions were necessarily remedied. The ships had been made by workmen heretofore, and now a Nansalian engineer developed a system of machines, which did half the work. In a month we had so many ships that we proceeded to attack, and so successfully, that we wiped out the Satorian fleet, and we stood guard over the planet—no more reinforcements from Sator!

"We destroyed one city then, by such a great concentration of our rays on it that their magnetic wall was broken. They knew they could not get more reserves from their world, and our ships were coming out in even greater numbers.

"Then," continued Torlos, his mind filled with thoughts of their treachery and hate for their methods, they did a thing which we had not even thought of. We did not know their methods then.

"They sued for peace. We were willing, and a delegation came in a ship that was painted red—our signal of peace. Their ship was escorted into our city and our officials treated with them. Their crews—they mingled with the people.

"I do not know how they did it, but when they left that night, they had discovered the secret of our great force. They carried that secret to their cities, and had the machines in operation in a week. They treated for peace—they argued; they debated—they delayed us, while they built up a fleet. Then they told us frankly that they would not treat with us. They left. The next day war broke out again and they had a greater fleet than ours. They beat us back to our cities. We took our ships in; we did not fight; we needed the ships for later use.

"It was nearly a century later that we were again able to make a great attack. The years between were years when each fleet was so nearly equal in power that neither dared attack actively.

"That was when we developed the system we now use for storing power, all power before this time had been generated on the ships; now we were able to store it. We had never before had a satisfactory method of doing this. This method was simple. We wind a coil of wire about a bone-metal (iron) ring, and the coil is of a soft, heavy metal, silvery, and easy to melt. But, when in very great cold, it becomes a very good conductor of electricity. It carries the current perfectly, and the electricity is stored in it, the current circulating about the ring. The current may now be tapped when needed."

"Wade—they store power in an induction coil cooled in liquid helium, wound with lead wire! A torus-shaped coil, so all the lines of force are used!" Arcot cried in surprise.

Torlos continued his story.

"With this, our ships were far lighter, smaller, swifter. We could carry bigger magnets. Need I say that we soon had the Satorians again at our mercy? They could not fight the faster ships, and went down to defeat.

"Again they treated for peace. We knew better this time, and we kept on with our fleet developing it, working on it. Their ambassadors stayed and parleyed and argued as before. We had our world to ourselves at last. The Satorians had been driven off. That was the consideration on which we would let them treat for peace, and they had been isolated again.

"The crew was kept in their ship now, and the ambassadors were kept with care—carefully treated as their rank deserved—given a 'Guard of Honor.'

"They all died ten days after they arrived. They had killed themselves. We could not guess why it was. We reported it to their government at once and prepared for an immediate renewal of hostility, expecting their disbelief.

"We became even more worried when they merely acknowledged the notice—with respects, and said they would send another commission.

"Twelve days after the ambassadors arrived, a disease broke out and spread like wildfire, or I should say, had spread like wildfire. For twelve days it gave no sign. Then the flesh rotted away. No wonder the 'Ambassadors' had committed suicide!" Torlos paused again.

"Millions of our people died. That was in the time of my father. He died. I had been attacked by the disease. They discovered a cure, and the people no longer died. We found that no cure was known on Sator. As soon as the infection was noticed the victims were at once killed, and the bodies burned.

"The men had all inoculated themselves with the disease, and spread it among us, at the sacrifice of their own lives. The people of Sator never lacked courage, nor loyalty, as I have said. The trouble was merely that their ideals of honor did not coincide with ours. They believed honor lay in the greatest cleverness.

"It was clever. It was only by accident that we learned the cure. A doctor was trying to inoculate a——

"But that is not what you want.

"By a miracle we recovered. Our fleet was undermanned. And, as we had expected, news came slowly then for we did not have radio. Their fleet started a month and a half after their ambassadors. They arrived to find us ready. They were quite unprepared for battle! They had brought colonists! It was no accident that these men had that disease!

"We destroyed the fighting element of the fleet, but permitted the non-combatants to return.

"Since then we have been again in a state of armed waiting. Neither has developed any weapon which warrants an attack, each is so spy-infested that no move can pass undiscovered. A number of my countrymen were killed in that battle. There were ten other men of the service in the fleet.

"But can you wonder that my people were suspicious when you appeared. Can you wonder that they drove you away. They were afraid of the men of that other world, Sator. You can understand how they felt when they saw your weapons, and that they were afraid for their civilization.

"But, on the other hand, why should the men of Sator fear? They knew that our code of honor will not permit us to make any such treacherous attacks. It is no great wonder our people drove you away, while these men were willing to speak with you. Could you blame my people?"

Thus Arcot translated the message. It was obvious that they had been only wise in doing as they had done. They could not expect visitors from another Universe!

Arcot went up to Morey now, and explained to him the course of the history of this world they were to revisit, and why it was that the men had driven them away when they had come to their cities.

"They were certainly reasonable in driving us from their cities. Experience had taught them that was the safest way.

"BUT experience has taught me that, unlike Torlos, I have to eat. I wonder if it might not be a good idea to take a bit of a nap also; we have been going rather at a good pace. After breakfast we can enter Torlos' planet refreshed. I don't know but what Torlos might wish to sleep also."

"Good idea, I think," said Morey. "I'll ask Wade if he won't stand guard while we sleep. If Torlos wants to speak to some one, he can communicate with Wade about it as well as with any one else. I am due for some sleep myself. The acceleration of almost exactly normal gravity is tiring, now.

"Oh, by the way. I found out one reason why Torlos was able to throw our friends around that way. He is trained for the secret service, and part of that training is a very strict course in physical development. He is unusually powerful, even for his world.

"But I'll ask Wade to relieve you at once."

Arcot shot down the corridor under the impulse of a gentle push, and turned into the library.

"I'm getting the trick in this thought communication, now, Arcot," said Wade enthusiastically. "I heard what you and Morey were talking about, and I'd be glad of the opportunity, I am not tired. I didn't engage in the little playfulness that you and Morey did. I asked Torlos if he wished to sleep, and it seems that they do it regularly one day in every ten. And when they sleep, they sleep very soundly. It is more of a coma than a sleep with them. They can train themselves to sleep on any day they wish, but it is customary to sleep once in ten, so that commerce will not be interrupted by the men sleeping on the wrong days. If you want to do busines with Mr. John Doe, and he happens to be asleep, and destined to stay that way for the next forty hours, which is their day, it is just too bad, you have to wait. So they all sleep the same day. It would be bad for one of those fellows if he went to sleep in a class, or lecture! They'd have to call in the ambulance or something to carry him home," said Wade, smiling, as he remembered the remark one of his friends at college had made, unconscious of any humor. "I've got to go to more lectures. I've been losing a lot of sleep." He had meant the thoughts as disconnected ideas, but knowing his habits, his classmates had realized that they were not as disconnected as he meant them to be. That man now boasted an income of over a million a year.

"Oh, no," replied Arcot, "one of his friends would just tuck him under one arm and carry him home, or on to his next class. Remember, they only weigh about 400 pounds on their world, and that is no more to them than fifty is to us."

"That's true! Well, I'd hate to have him wrap his arm around me. He might get excited and squeeze, and ——!" said Wade, looking at the huge muscles of Torlos' arms.

Arcot, Morey and Fuller went to their rooms and tried to get some sleep. Morey and Arcot were tired, but Fuller rose after two hours and went down to join Wade.

"Hello—I thought you had joined the Snoring Chorus long ago!" greeted Wade.

"I tried to, but they made so much noise, I couldn't get in tune," grinned Fuller. "What have you been doing?"

"I have been trying to talk with Torlos—and had fair success. He was amazed at the power of our ship when I showed it to him. Did you notice the sun?"

"Oh—we have moved a bit!" said Wade. They had indeed. They were now so far from the sun that it was a tiny disc of cold light before them.

"I moved the ship a bit and showed Torlos what real speed was; then I started back toward his world and I'm waiting for Arcot now," said Fuller.

Arcot and Morey woke about three hours later, and the trip was resumed.

They took their meal, much to Torlos' surprise.

"I can understand that you need far more food than we do, but still, when you tell me that you ate only a few hours ago, it seems a tremendous amount of food. How can you grow food enough in your cities?" This from Torlos.

"That's why you don't have any rural districts. We have farms on our world, outside the cities. Food is grown out on the plains, where there is room. We find difficulty, but our machines make the task lighter. We could never have developed the cone city type of civilization that you have, however, for we need huge quantities of food."

Arcot thus translated to his friends the secret of the lack of rural districts on Nansal, and continued:

"You know, I really must admit that Torlos' people are a higher type of creation than we. Man is a parasite; all animals of Earth are parasites of the plant world. We are helpless to produce our own foods. We have to live on the products of plants. We can never gather energy for ourselves; we are as truly parasites as are fungi, or the germs of disease. We are to the plant, a malignant growth—a sort of cancer!

"These men are less so. They, at least, generate or extract their own muscular energy. They turn to the plant for their matter, the matter that makes up their bodies, but they get their energy from the air, from the sun directly. They combine the characteristics of the plant, of the reptile, of man, and of many other creatures we know. They are cold-blooded; they get their energy directly from the sun, like plants; they eat food like mammals——"

"It beats me. I don't know what you would call them!"

After the meal, they went to the control room, and to Torlos' immense joy, they were at last started for his own planet.

"We are going now, Torlos," said Arcot. "Come to the control room and watch." They went to the control room, where Torlos was fastened in one of the chairs. Then Arcot pointed out his planet, the little dot in the vast distance, for they were over a billion miles from it now.

"Watch it, as we go. Keep your eyes on it, for there will be many other stars showing soon. Watch it grow as we draw near."

Arcot pushed the little red switch to the first notch. The air about them was tense with the snapping of the field of electricity, and every sharp point was surrounded with a faint haze, a corona. Then space had readjusted itself. They were fleeing along now, the stars seemed moving ever so slowly, but there were some that seemed now to race across the skies; these were the planets within a few billion miles; at this velocity they seemed to move swiftly. The sun was welling up to meet them, expanding its bulk with awesome speed; then the point that was Nansal had grown to a disc, and then it was swiftly leaping toward them; it was nearing, expanding, growing, at a rate that made Torlos clutch his chair—there was a sudden crashing, splintering sound, and Arcot had jerked open the circuit, half in alarm. They were almost motionless again as the stars reeled about them.

TORLOS had been nervous. Like any man so affected, for his nervous system was, after all, like ours, he had tightened his terrific ally, his powerful muscles. The chair was made of wood. His fingers had sunk into the wood and crushed the wood as if it had been crushed in a vice!

"I'd hate to have him take hold of my arm and try to hold it tight!" said Wade eying the splintered chair with a judicious air.

"I'm very sorry—I did not intend to do that; I forgot myself when I saw that planet rushing at me so fast. I am sorry, indeed," thought Torlos humbly, his chagrin apparent in his face. Arcot read this thought, and then laughed.

"It is nothing, Torlos—we are merely astonished at the terrific strength of your hand. Wade was not worried; he was joking!" Torlos seemed much relieved, but he looked at the splintered wood and then his hand.

"It is best that I keep my too-strong hands from your instruments!" he communicated.

"Indeed, it is!" rejoined Arcot. "We would be stranded if you destroyed some of them!" laughed Arcot.

But Arcot was busy now. They had come within a hundred thousand miles of Nansal, which was, really, nearer than Arcot had intended to come, for, although they were passing it tangentially, actually that distance represented a tiny fraction of a second's motion! Had they deviated, they would have crashed into the planet and their coils would have been destroyed instantly. They were moving slowly, in normal space, only four miles a second, so they were falling swiftly toward the planet. Arcot turned the ship so that its original velocity was directed toward the planet. They dropped nearly three-quarters of the distance before their speed was over orbital velocity. Then Arcot began to decelerate. They reached a point 500 miles from the planet very quickly then, and Arcot slowed the ship till it dropped into the atmosphere. In a moment the air resistance had checked its motion greatly, for they had been going nearly fifteen miles a second and the outer shell became white hot in an instant. Arcot closed the relux shutters till he was no longer bothered by the heat radiated inward. He knew the temperature of 8,000 degrees would be quite harmless as far as the outer wall went, and it saved power. He was making the air absorb his energy of motion, instead of using more power to overcome their speed.

Soon, however, they were drifting again over the broad plains of the planet. Torlos told Arcot that by far the larger percentage of the planet's surface was land, yet they had vast quantities of water, for their seas were exceedingly deep. Some ranged over thirty miles deep for hundreds of square miles. The pressure at this depth is terrific, and the density of the water increased a little under the pressure, for water, though practically incompressible, still has a slight compressibility, as has any matter, in any state, liquid, solid or gaseous. Earth's crust is practically perfectly smooth, the variations amounting to less than the variations in the surface of an orange. This planet was a bit less smooth. It also had gigantic mountains, some towering ten miles into the air, nearly twice the height of Earth's greatest elevation, Mt. Everest, at approximately 29,000 feet. This distribution of land and water was no doubt responsible for the fact that they had in each case landed on the planet over some land, without consciously guiding the ship to land.

Torlos, with shining eyes, was directing their progress toward his home city, and the capital of the world-nation. Over the great plain the *Ancient Mariner* sped, the air rushing around its streamlined hulk, and they slipped smoothly on.

"Is there no traffic between the cities here, Torlos? We have met no ships."

"There is a continuous traffic, but we are far off its line. The commerce must be densely populated with warships as well, and both warships and peaceful craft are made to look as much alike as possible. Then the enemy cannot know when the ships of war are present and when they are not, and the attacks are more easily beaten off. They are forced to live on our commerce while here. Before we invented the magnetic energy storage apparatus, they were forced to get fuel from our ships in order to make the return journey, for they could not carry fuel for the round trip. But now it is found that the coils weigh only a little more when full than when discharged, and we can carry energy for the entire trip.

"Our city now should be behind that next range of mountains."

They were flying at a height of twenty miles and the range Torlos indicated was low mountains far off in the blue distance; they were almost below the horizon. But as they were going at nearly ten thousand miles an hour, they would soon be there. The mountains seemed slowly changing; they seemed to crawl about on one another like living things, as we watched them, except that they grew larger and changed from the strange blue to a blue green, then to a green. Soon the ship was rocketing smoothly over them. Ahead and below, in the rocky gorge of the mountains, lay a great cone city, the largest they had seen yet. In fact it was of two cones. Like the "circus" tents of two centuries ago they rose, and there was a ridge in the center.

"Ah—home! See—that twin cone idea is new. It was not thus when I left long ago. . . ."

"AH—home! See—that twin cone idea is new. It was not thus when I left long ago. It is growing, growing, and that new section, see, they have bright colors in the buildings. All the buildings are colored, and already they are digging foundations far out to the left for a third cone. All the city will be extended. Ah, but they won't have to, if you will give us the secret of the rays you use!

"But Arcot, you must hide in the hills now; go closer to the city, and deposit me in the hills. There I must walk to the city on foot. Long ago it was agreed that if I ever returned, I would return on foot, and I would wear certain insignia. Their ships will come down—I will soon be home and telling the Supreme Three that I have salvation and peace for them!"

"We'll take you close to the city, invisible, then you can drop, say ten feet from the ship to the ground, and continue from there. That will be all right, won't it?" asked Arcot.

Torlos agreed that it would, so Arcot made the ship invisible, and they dove down toward the city, stopping just a few hundred feet from the base of the magnetic wall, near one of the great magnetic beam stations. Torlos dropped from the door of the airlock, after agreeing to meet the Terrestrians in a one-man flyer by coming out into the hills slowly, at a low alti-

tude. Arcot was to become visible and follow the little machine into the city.

"You need fear no treachery from my people," communicated Torlos, sincerely, then, smiling, "if you need fear treachery at the hands of any people! You have certainly proven your ability to defend yourselves! Certainly my people, had they such treacherous intents, would have been convinced by that escape from the Satorians! For they have already heard all about it, no doubt—all save the actual destruction of the city. And by this time they may have learned that the city is missing, and that there is only a vast chasm to show for it. Certainly they should have been able to guess at the reason."

He paused a moment, and then asked: "Is there any message you wish me to give to my Supreme Council of Three?"

"Repeat to them the offer we made to the Emperor of Sator. We will give to them the molecular ray, the ray which tore that city out of the ground, and as your people of this world have seen, also tore the mountain down; we will give them the cosmic ray, which will destroy anything, blasting the very atoms of which it is made, except the material of which this ship is made. And we will give to your people the secret of this material too. And we will give them the secret of the most terrific energy known to mankind—the energy of matter itself. With these, Sator will soon be peaceful.

"In return we ask things that, while costing you nothing, are invaluable to us. We have lost our way. In the vastness of space we can no longer find the way to our own Universe. Ours is the largest in this part of the Cosmos; it cantains approximately 300,000 million suns, nearly 150 times as many as any other Island of Space in this part of the Cosmos.

"Also, we need more fuel; our fuel is lead wire. We need thin wires of that metal of which you make your power storage coils. That we use for fuel.

"And we would like books of your people, and photographs, which will prove our visit, that they may know, on our world, that we have in truth been out in space.

"That, and peace is all we ask.

"But, Torlos, we should like the secret of your power storage coils. If you do not wish to disclose this secret to us, don't do it. We will have no real need of them; we have a better one; we are merely interested."

"Torlos," added Arcot, suddenly remembering something he had forgotten to ask, further delaying the parting, for they must remain visible that Arcot and Torlos could communicate, "did your people try using very heavy currents in the magnetic energy machines?"

"The things you ask, I am sure my Council will gladly agree to and the secret of the magnetic coil we will gladly give you, I am certain.

"During the early experimenting they attempted to use very fine wire and heavy current, for the wire had no resistance, and it seemed thus, that they could get more power in less space, but there was a difficulty. In every case, a new, unknown, and still inexplicable phenomenon came in. The wires remained cold for but a short time, and in that time, the substance all about the machine glowed strangely and grew hot. Men near it were killed instantly. The air about it glowed with tremendous brilliance—why—just like the air in the path of the rays of death you use—the rays of heat—the rays—they must be the same! The rays that came from this machine were able to change matter, as these rays of yours are!" Torlos communicated sudden surprise.

The "exclamation" was, of course, telepathic.

"They are the same, Torlos. But you could never have used them, for you must have this metal here, relux, that you may direct the rays," explained Arcot

THEY went to the city, and Torlos dropped off. The ship jerked up as the load of his weight was removed; then they were rising and Torlos was suddenly visible on the plain, leaping forward in great leaps of twenty feet, graceful, easy leaps, that told of tremendous power. He ran on lightly. Suddenly a magnetic ship was darting down from the city toward him. It curved down, and as it drew near, he made certain signals; then he stood still, with his hands behind him.

Two men dropped thirty feet from the ship to him and questioned him. Then they motioned to the ship; it dropped to ten feet and the men sprang lightly up to its door and entered it. The door snapped shut and the ship shot up and toward the city. A moment it hesitated at the magnetic wall, then it was in and out of sight, lost in the busy traffic of the streets.

"Well, we will now go back in the hills and wait," said Arcot.

Back in the hills they lay on the ground, visible now, keeping a close watch of the sky, yet sitting easily in the deeply cushioned seats, talking, and discussing more in detail this race of strange people, who seemed to combine the properties of plant and animal, cold-blooded, yet with an organ for maintaining warmth; with mobility that defied the plant, and carnivorous as well as herbiverous traits; incapable of living directly on the soil, yet absorbing unfixed energy from the air! Their iron bones, and great intelligence—a strange combination to Terrestrians.

"I wonder if their bones are put together quite as ours are?" said Morey.

"I'm sure I don't know!" replied Arcot. "I was thinking of asking for a skeleton as part of the relics we take back with us."

"LOOK—there's Torlos!" called Wade, pointing to a tiny ship, which was rapidly approaching the hills and circling slower as it drew near.

They rose and sailed out over the hills. In a moment Torlos had spotted them, and came toward their ship. He motioned them to the ground. They landed. Torlos came toward the ship, and aboard. He was smiling broadly.

"I had some difficulty convincing them my story was true! When I told them that you could go faster than light they strongly objected. But they had to admit that you had certainly been able to tear down the mountain very effectively, and they had reports of the total destruction of the city of Sator. It seems you first visited Thanso when you came here. The people there were panic-stricken when they saw you utterly destroy a mountain, then tear that magnetic ray station up! It had never been done by any one ship.

"But the fact that several guards had seen me materialize from thin air, and my explanation, *plus* the fact that they knew you could make yourself invisible, at last made them believe. They want to talk to you, and they say they will gladly grant your requests—on one condition. You must promise to keep yourself away from any of our people, for they are afraid of disease. Germs that do not bother you, may be deadly to us, and they are very much afraid of you. I will lead the way back to the city in the little ship."

"We will keep apart from your people if the council wishes, but there is no real danger. We are too vastly different. Are your animals all suceptible to the diseases you have? We are so vastly different from you, that it will be impossible for you to get our diseases, or for us to contract yours. However, we will do as your council asks," Arcot informed him.

Torlos slipped out again to his little ship and went at once toward the city.

Arcot brought the *Ancient Mariner* along behind,

easily, keeping about three hundred feet to the rear.

They went smoothly on. In a moment they had reached the great magnetic wall of the city and glided through. On the roofs of the buildings men were collected, watching the shining, polished hull of the strange ship as it glided across the roofs of their city. They climbed swiftly up, until they had reached at last the great central building, and settled slowly to the floor of the great courtyard.

About them, in regular rows, the great hulls of the Nansal battleships were arranged. Torlos settled in a little space, the one space where there seemed room for the *Ancient Mariner*. Then almost at once he rose and sailed off, landing on top of a nearby battleship. A moment later Arcot had landed the *Ancient Mariner*, and the power was shut off.

"I think that Wade is the man to go with me this time, Morey, as he has learned the 'language' and can converse with them. We will each carry a molecular ray pistol and a cosmic ray pistol, wear the power suits, and carry a radio. This time I don't believe they will start any actions we don't like. But I am no longer so confident, and I am not going to take any useless chances. This time I am going to make arrangements. If I die here, there is going to be a very costly funeral. And further, these men are going to pay the costs! I will call you at least once every two minutes. If three minutes goes by without a message from me, call me, as a warning. Allow one minute more. Then, if nothing happens, why start things because you will be able to use a free hand without injuring me. Start on this building. I am going to tell Torlos about this. If the building is shielding the radio, I will be listening for you and will return on my steps until you can hear me. Right? Then come on, Wade!" Arcot, fully equipped, strode down the corridor and to the air lock. Torlos had appeared now, and with him a single man, a high officer of the patrol explained Torlos, for he, Torlos, was without official rank. His was a secret service and he therefore had no official status. An officer was assigned to accompany him.

Torlos seemed to be relaxing now in the warm, yellow sunlight of his own world. It had been years since he had seen the warm sun, save from the windows of a space-flyer. Now he could walk around in the warm air of the world of his birth.

"You, of Earth, imagine spending your years on a sunless cloudy world such as Venus. To the Venerians it is a beautiful world, a world of soft, silvery radiance, while Earth is a world of glaring, blinding light, a world of burning light, that turns the skin raw with its heat. But to us, it is a beautiful world!" This was Torlos' communication.

Arcot explained to Torlos the precautions they had taken against trouble here. Torlos smiled.

"You have learned greater caution. I cannot blame you. We certainly seem little different from the men of Sator; we can only stand on trial. But I know you will be safe. I wonder if it would not be wise to shut off your set as we enter the elevator. Might not the magnetic force affect it?" Arcot had thought of that and had fully intended shutting off his apparatus.

They were walking now across the great court, covered with a soft springy turf of green. The hot sun shining down on them, the brilliant colors of the new buildings of this part of the city, the towering walls of the magnificent building they were approaching, and behind them the shining shell of the *Ancient Mariner*, set amongst the dark, needle-shaped Nansalian ships, all combined to make a picture that would remain in their minds for long. Here no guards were watching them. They were being conducted to the meeting of the Council of Three.

THEY entered the main entrance of the great government building and stepped into the great hall on the ground floor. It was like the nave of some ancient cathedral, when the Church of Earth was corrupt with political power, ruling the people by the power of politics, and forgetting that they were men of God. But they had produced beautiful things then, and this hall was like them.

Great pillars of the green stone rose in graceful, fluted columns, gracefully curving out, like the branches of some tree, to meet in arches that rose high in pleasing curves, meeting at a point midway between four pillars, while the walls were made of the dark green stone as a background. On them had been traced designs in colored tile or stone. The hall was indeed a thing of colored beauty and the color gave it life, as the yellow sunlight gave life to the trees of the mountains. The graceful arches alone were not enough, but this touch of color gave an added beauty. They crossed the great hall and came at last to the elevator shaft, its door made of narrow strips of metal, so bound together that the whole made a flexible but strong sheet. It was, in principle, like the cover of one of the antique roll-top desks. Now, some things are old and beautiful and some things are just old. The roll-top desk was old, but these men had made their elevator doors very attractive by adding the effect of color. In no way did they detract from the dignified grace of the great hall.

Torlos communicated with Arcot as they entered, "We will ascend more gradually this time, Arcot, so the acceleration won't be so trying to you. I will go up by short stretches."

WADE had been talking to Morey, explaining that they would be silent for a moment. Now they entered the elevator, and by gentle steps, each step representing an added magnetic impulse, they rose to the sixty-third floor of the giant building.

As soon as they stepped out of the elevator, Wade attempted to call Morey. To his relief he contacted.

The officer was leading them down a green stone corridor, sufficiently decorated to relieve all feeling of monotony.

They came to a simple door, like many of the others, and entered the room beyond. A table was here, in triangular form, and in the center of each side sat one man on a slightly raised chair, while on each side of him sat a number of other men.

Torlos stopped at the door and saluted. Then he spoke in rapid, liquid syllables to the men sitting at the table, halting once or twice, and showing evident embarrassment as he did so. He paused, and one of the three men in command replied rapidly, in a pleasant voice, that had none of the harsh command that Arcot had instantly sensed in the voice of the Satorian Emperor. Arcot liked the voice and the man. He was, judged by Terrestrial standards, past middle age, whatever that might be here on Nansal, and his crisp black hair was bleaching slightly. His face was showing the signs that worry must always leave, but although the face was strong with authority, there was a gentleness that comes with a feeling of kindly power.

Torlos was turning to Arcot, as he rapidly radioed to Morey the scene before them, the great table of a dense, black wood, the men about it, some in the blue uniform of officials of this nation, and some in the loose, soft garments of the civilian, their colored fabrics, individually in good taste, and harmonious, were frequently badly out of harmony with the costume of their neighbor, a difficulty accompanying this colored clothing.

"The Supreme Council asks that you be seated at the table, in the places left for you." Torlos paused, then

quickly added to his thoughts, for Arcot, "I have told them of your precautions, and they have said, 'A wise man, having been received treacherously once, will not again be trapped,' and they approve of your policy of caution."

"Those men who sit at the raised portion of the table are the Supreme Three, these others are their advisors, knowing the details of Science, of Business, and of War. No one man can know all branches of human endeavor, and this is but a meeting place of those who know best the individual lines, with the Supreme Three, elected by these others, on the death of a member, act as coordinators. The man of Science is to your left. He directly before you is the man of Business and Manufacturing, and he to the right is the Leader of Men and our Commander in Battle.

"Is it not to the man of Science you speak first?"

"I must first tell the Scientist what it is I have, then I will tell the Warrior how he may use it, and they may tell the man of Business what it is they need.

"But you are my connecting link. I must at all times be facing you. We cannot sit at the table and yet face all, as I wish. Cannot chairs be brought for us here?"

While Torlos was speaking to his Supreme Council, Arcot related rapidly to Morey what had been said, thus telling Wade as well.

Before he was finished, the chairs had been brought by two men who entered, after one of the Three had spoken into a telephone. These men wore holsters for the pneumatic pistols, but they were conspicuously empty. Arcot was both pleased and embarrassed to notice this. What should he do, who carried two deadly pistols? He followed the least conspicuous course, and left them as they were.

The audience had begun. As quickly as possible he explained to the council what it was he wanted.

"We have come from a vast distance across space. We have come from another Island Universe. Let your astronomer tell you of the distance that represents." Arcot paused, while Torlos translated, and a moment later one of the Scientists, a tall, powerfully built man, even for these men of giant strength, rose, and spoke to the others. When he was seated, a second rose and spoke also, with an expression of puzzled wonder.

"He says," translated Torlos, "that his science has taught him that a speed such as you say you must have made is impossible, but the fact that you are here proves his science wrong. And he reasoned that your kind live on no planet of this system, hence you must come from another star, and as this is as impossible as coming from another Universe, according to his science, he is convinced of the fallacy."

ARCOT laughed, the sound reasoning of the man was creditable; he did not label it "Impossible"; he realized that their very presence was proof. Arcot relayed the message to Morey, then replied to Torlos, that his men were indeed intelligent in being willing to accept a new fact, a thing that his own people would not be so ready to do. Then rapidly he tried to explain the facts of his trip. It was impossible. Torlos, a warrior, not a scientist, could not comprehend the ideas; they were far ahead of anything his own people had conceived; he could not translate them.

"The Physicist suggests that it may be easier to think directly to him, the thoughts being more familiar to him, perhaps, than to me," Torlos smiled. "They most certainly are."

Arcot strode over to the Physicist, and looking into his eyes, concentrated deeply—to his surprise and relief the man was a perfect receiver. He had a natural gift for receiving thought. Quickly Arcot outlined the system that had made the trip possible.

The Physicist smiled when he was finished, and vainly tried to reply. The men who receive most readily seldom transmit easily. Torlos aided him.

"He says that the science of your people is a million years ahead of us. He says that the conceptions are totally foreign to his mind, and that he can but now grasp the magnitude and possibilities of the idea—bent emptiness he calls it—that you have given him. He says he can fully appreciate the possibility that you have shown him. He has given your message to the Three, and they are now anxious to hear of the weapons you have."

Arcot drew first the molecular pistol, and looking to Torlos, explained that it would be easier to give the ideas to the Physicist. He turned to him now, and holding up the pistol, explained the general theory of the ray. The idea of molecular energy was old to this man, for he had been making use of it all his life, and it was well known that the muscles used the heat of air to take advantage of its energy and do their work. This ray he could understand, but not until Arcot projected into his mind the powerful mental impressions of the mighty blazing suns that had swirled about them in space, when their ray had thrown one mighty sun hurtling into the other, and he had shown him mental images of that mountain tumbling, crushed, into the ravine, and of the city flying off into space as Torlos directed his ray upon it.

Awed, the man translated the ideas to his fellows, while Arcot drew the cosmic ray pistol and reported to Morey the results of their conference.

"This pistol," continued Arcot, "uses a ray that exists naturally in space, one I think you have never detected, but have accidentally produced. You have all the essentials of the ray in your magnetic energy storage machines, save that you have no means of directing and controlling it.

"You know the nature of light? Of ultra-light? And of X-rays—then of the elements that break up spontaneously, an element that is very heavy and has a valence of two; an element that, very active chemically, will decompose water spontaneously, forming hydrogen and the hydroxides? That element gives off a certain ray, and its atom breaks. You know that?"

Torlos had to answer—they did, it was rare, but there were others rarer. It was very hard to separate, because it was contaminated so by a large amount of another element, which was lighter, and chemically exactly like it, save for reactions with a green gas, and a heavy brown liquid, and a very dark blackish gray solid. Arcot smiled at the description of chlorine, bromine and iodine.

He meant, of course, that the solubilities of the corresponding radium salts differed sufficiently to permit a separation.

"That element," continued Arcot, "gives off certain very short waves. These rays are far shorter, and are given off when the atom is utterly annihilated. These rays are so energetic that they will blast the atom, and make any atom save that of helium, or other very stable atoms and hydrogen, break up, and, like radium, give off rays, at the same time becoming tremendously hot. I will show you a very dangerous experiment. I will show you the powers of these rays."

Arcot asked that a lump of any sort be brought in; any mass of matter. A large mass of iron, a broken casting, was produced in a few minutes, and Arcot suspended it on a molecular ray, while Wade melted it with the cosmic ray. Cooling it again with the molecular ray, Wade lowered it to the floor, a perfect sphere, encrusted with ice and snow. It was very cold, yet a moment ago it had glowed brilliantly and its surface had flamed as it burned in the oxygen of the air, while

the men had shielded themselves from the heat radiated. This was dangerous, because other rays were radiated also, but in infinitely smaller amounts.

For half an hour Arcot told the men what it was he had with him.

Then he told them what it was that he wished.

"We use lead on our ship for fuel. This, we need. Although we probably have enough to last us, we want to be sure. And, more important, we need information of our directions. We were caught in space by a giant sun, and while tearing ourselves free, we lost all sense of direction. We must find our way back. I wish to explain the case to the Astronomer."

THE Astronomer proved to be a man of powerful intelligence, as well as powerful physique, and was, therefore, a better transmitter than receiver. Arcot's training was limited, and his powerful mind was needed to transmit to this man, who was the next in line to the Scientist of the Three.

"We men come from a planet, Earth, in a solar system of an Island Universe in remoteness approximately ten million times the distance light goes in the time your planet revolves about its sun." Arcot was counting more on reason than on actual knowledge now, for he was again assuming that the year of this planet was very closely equal to that of Earth. It was slightly further from its sun, which would mean a longer period, but its sun was also heavier, which meant a greater centripital force, and hence a greater centrifugal force. This, in turn, meant greater orbital speed, and so a shorter year. The two should have balanced, and certainly Arcot knew little enough of his distance from Earth!

"We cannot locate this Island Universe, for to do so would require many years of patient search and observation. We ask that you, who must have made many researches into the stellar spaces, and have had time to discover the greatest and the most massive of the Island Universes, tell us which it is, that we may go home.

"In return, besides the weapons we have given your people with which to defeat their enemies, I will give you a weapon by which you can defeat your greatest enemy, space! It is an electrical telescope, which will permit you to see the life on every planet of this system. It will permit you to see a man at a distance of 1,000,000,000 miles, ten times the distance of your planet from the sun.

"And we wish peace."

Eagerly the Astronomer questioned Arcot concerning the telescope. To him it was indeed a marvelous weapon against his greatest enemy, distance.

But others were clamoring for Arcot's attention. The biologist was the foremost of the contenders. Perhaps he was right, at that. If Arcot were a biological menace to them, then it would profit them little were they to destroy the enemy by his weapons while his germs destroyed them.

Torlos translated for him. "Torlos has told us that you have an entirely different organization. What is it that is different? I cannot quite believe that he has correctly understood you."

"The principal differences," Arcot informed him, "are that we are built on a framework of stone and that our muscles are typical fuel-burning engines." Arcot explained differences as carefully as possible. By the time he had finished, the Biologist felt sure that any such creature was certainly sufficiently far removed from them to be harmless biologically. But he wanted to study Man of Earth further. Arcot had brought along a collection of medical books as a possible aid to them in case of accidents. These he offered to give to Nansal, if they received, in return, a collection of the books of Nansal. The English would have to be worked out with the aid of a dictionary, and a primary working basis which Arcot would supply. And Arcot asked for a skeleton. The Biologist was more than willing.

The Military Leader was the man who demanded attention next. With him Arcot had a long conference. It was mutually decided that they had best demonstrate the powers of the ship. The Three were to come, as well as the Physicist and the Astronomer.

The party descended to the ground floor, and walked out to the ship. Though the men had all seen the ship from a distance, this close view made them gasp in surprise. The lux metal wall was a thing they could scarcely see, and yet they were soon aware of its hardness. The shining surface and the graceful shape pleased them immensely.

They had to come through the small airlock in two parties, and in the main power distribution room they looked in amazement at the tiny machines that ran the ship. The long black cylinder of the main power unit looked weak and futile to men who were used to the bulky apparatus of their ships. The power coil interested the Physicist immensely, of course, as did the battery of storage coils, with the spot of intense and utter blackness within them.

But the ship was a constant source of wonder to them. They investigated the laboratory and then they went up to the second floor. Morey and Fuller had greeted them at the door. Each had in charge a group of men, to whom he was attempting to explain and answer all questions.

"These men don't know much about spatial physics, but they certainly make me look sick in chemistry. They have just one discovery that means all to them, and consequently to us. We will get that, too. The Physicist just told me that they have discovered the secret of a catalysis, and they know what controls it. They can design a catalyst, just the way we design a molecule, determining its color and other properties beforehand. The result is that they can do a lot of things we only talk about. And they have thus solved one great problem. The Biologist is hard at work on the development of it now—on artificial living cells. We have known right along that they were just a group of catalysts, but they made some new ones, and they don't even have cell membranes. They have bodies now! They have tiny creatures that they have actually evolved from single-celled things. They made a sport, or freak, and they succeeded in fixing it." Wade stopped and tried to explain the purpose of a knife, with which the Astronomer had just succeeded in cutting himself. It was quite new to him. They used a sort of rotating disc with an exceedingly sharp edge, the rotation being accomplished by pulling a rachet ring with the inner thumb, while the other thumb of the hand was busy holding the tool. A very simple apparatus, but, as Wade objected, an awful thing to have to wash. Besides, it is only adapted to a hand with two thumbs.

The library was the point of great interest, only exceeded by the control room. Arcot found some difficulty in taking care of all his visitors. The Three were immediately equipped with chairs, but the pilot must sit down and the others were forced to anchor themselves as best they could. But, due to their tremendous strength, this was simple enough. They were ready to go out into space and demonstrate the action of the ship. However, they wanted to convince the military leaders that it was all that it was supposed to be first.

ARCOT chose a barren hillside for that. It was a great rocky cliff, high above the timber line, above which he saw the snow-capped rocky shoulder of the

mountain. It was a huge cliff, towering fully a thousand feet above, almost vertically.

Then the pale beam reached toward it.

The huge cliff was spread out over five square miles of territory. It was thrown ten miles into the air, the air whining, roaring and whistling about it as it went up, and then it was coming down, red hot now, and it struck the snow-covered mountain top, shivered into a million fragments with a terrific roar, and the rocks rolled down the mountain side, their path traced by a line of steam clouds.

Then Arcot trained the cosmic ray on the mountain peak. In an instant the snow was gone. He had drawn the relux shutters over the windows to keep out the unwanted rays, then the cosmic rays were turned on in their full power. In less than a minute the whole mountain peak was a pool of molten rock.

Now something else was happening. Flames were shooting up from the mass; blue flames they were that shot higher and higher, and were almost invisible in the radiance of the incandescent rock. And other things were happening. The air all about the mountain peak was blue, and glowing brilliantly, while crackling sparks developed. Then slowly great streamers of electric fire wound down from the mountain top, striking rocks, and shivering them open as they expanded suddenly with the heat. The blue flames were reaching higher, and the heat, coming from the rock, was so great that they could feel its searing radiation. Then Arcot shut off the cosmic ray, and turned on the molecular ray.

The molecules of the molten rock were traveling at prodigious velocities; the heat was terrific. Arcot could see that the rock was boiling quite freely. The molecular ray hit it, and with the roar of a meteor it was plunging at five miles a second out into space and gaining speed swiftly! Then it was out of the atmosphere, and rushing, cold now, through space, at still higher speeds.

Arcot followed it at his leisure, in the ship. It was going too slowly. He heated it further with the cosmic ray and drove it on with a molecular ray. Then he had it in an orbit about the planet, as they reached free space!

"Tharlano," he said, or rather thought, to the Astronomer, "your planet has a new satellite!"

"So I perceive!" replied Tharlano. "Can we now use the wonderful instrument of which you told me?"

Arcot established the ship in an orbit twenty thousand miles from the planet and then led them back to the observatory. Below them the planet was turning slowly, and the vast panorama of the sunlit world was a wonderful sight. Torlos, however, protested that he preferred to be there. He had looked at it for many years, and much preferred being there!

Through the weightless car they went to the observatory, where Morey had already trained the telectroscope on the planet below, and the amplification showed only the rushing ground and a blurred picture of the land below rushing past them, they were so close.

Instead, he trained it on the planet they had left for good, Sator. It filled all the screen as they increased the power; then it was only a section; then they were looking at the billowing clouds. It was a poor subject.

The Astronomer was content to sweep the sky with this wonderful instrument. It was such a thing as he had longed for!

But the Military Leader of the Three pointed out that the Satorians still had a weapon that was reported deadly, and they were in imminent danger of being wiped out by their own stolen science, and that Arcot's inventions should be applied at once. So they returned to the planet and to the council room. All the way to Nansal they spent the time discussing the problem in the *Ancient Mariner's* library. Arcot and Morey were both here, while Fuller piloted the ship. Torlos was needed in the conference.

It was finally agreed that the necessary plans and blueprints were to be given to the Nansalians who could start production at once. The greatest problem was in the supply of relux and lux, for these were necessary and their vast energy-content made them possible only with the aid of material energy, so the *Ancient Mariner* supplied the necessary start, and the necessary starting materials.

They began to carry out the plans for making the equipment as soon as the ship landed. They at once called the manufacturers together and the plans were distributed, for the *Ancient Mariner* carried a supply of all the necessary plans, in case of need. They were very useful now.

The days that followed were exceedingly busy days for the Terrestrians.

The Nansalians were wildly fearful of the consequences of the weapon that the Satorians had to attack them with. The results of their investigations through their agents had, so far, ended only in death to their men. They knew only what the Satorians wished them to know, that the instrument was new and deadly.

The Satorians, on the other hand, were not in the dark as to the progress of the Nansalians.

Arcot and Morey found this out.

Arcot had, of course, been tremendously interested in finding their home Universe, and, realizing that the Nansalians were vastly interested in erecting a barrier of molecular ships, and a series of molecular ray projectors, Arcot had first turned his attention and the attention of his friends to helping them. Fuller had proven invaluable, for his knowledge of designing had permitted him to smooth their ways greatly. They had no such machinery as was required for the manufacture of the tubes needed. The tubes such as Arcot's machinery required, had never existed on Nansal, and Fuller had to design the machines to make them, then to interpret the designs for the artisans, then to supervise their execution.

But it was done.

The men of Nansal were exceedingly grateful to these Terrestrians, and equally realizing that the question of their directions for returning home must be uppermost in the minds of their visitors, Tharlano had begun a systematic search of the known nebulas. He already knew which was the largest, but he wanted to make certain. He had invited Arcot and Morey to join him in the observations. His observatory was located on the barren peak of an exceedingly high mountain, more than seven miles high, and built on the solid rock, high in the clear air, so far from disturbing influences that he could get what approximated to spatial conditions, and while he could not use as great a magnification, for the air still made his pictures, or images, indistinct, still for observation of stars, the fixed and low power telescope was far preferable to the unstable high magnification telescope of a space ship. Also, the telescope here was able to use a gigantic mirror, and hold it more fully vibrationless than could any space-flyer. The mere movement of a man was sufficient to deflect the angle of a space-flyer, but millions of tons moving about the planet would not affect the angle of the observatory instrument noticeably.

THE observatory was accessible only from a space ship, or air machine. The great observatory was entirely enclosed, against the biting cold, and the lack of air. Also, a constant temperature was necessary,

lest expansions and contractions due to differences in temperature, throw the mirror out of true.

Arcot and Morey had gone on this trip, leaving Wade and Fuller in the constulting office of the Three. The Nansalian ability to go for long periods without sleep had made it difficult for the Terrestrians, and the vast quantities of food the Terrestrians consumed was a never-ending source of wonder to the Nansalians. This trip had been taken more in the spirit of recreation now, for, to Arcot's great relief, Tharlano had pointed out to him, with the aid of the telectroscope, the nebula that was our Galaxy. From this place they saw it almost edge on, and so it would indeed have been impossible for them to recognize it. It looked small, yet Tharlano had found, by measurement of stellar velocities of its edge suns, that it was by far the largest, its mass being approximately 280,000 million times the mass of their own sun. The Universe they were in puzzled Arcot. He tried to conjecture which one of the many visible from Earth it must be, and from a careful perusal of the star charts, decided it was N. G. C. 4594, which contains approximately two thousand million stars, hence our Universe, 200,000 million times as heavy as our sun, was approximately 150 times as massive as this Universe.

They landed the *Ancient Mariner* on the landing platform, blasted from the rock, which was the precarious ledge on which all ships landing must rest.

Torlos had accompanied them, but his giant frame would not fit into a standard altitude suit such as the Terrestrians had brought, although he was supplied with a power suit of Terrestrial origin, he had been forced to use one of the rubber and cloth suits of Nansal.

They flew across to the observatory, where Tharlano awaited them, and were at once admitted into the air lock. Next they were in the observatory; its warmed room made observation far more comfortable, and to these people who lived on heat, far safer and easier.

The floor was of smoothed-off solid rock, and in this the great clock which drove and timed the telescope, was set. The dome, made much like an old gas tank, was sealed with mercury, which had to be heated at times to prevent freezing in the cold, and could be completely rotated. The entire dome turned with the telescope. The telescope itself being a reflector, had been constructed with an airtight tube, and the lenses of the optical system were used to seal the little observation tube or eyepiece.

Arcot and Morey were vastly interested in the huge machine, which was, of course, equipped with its magnetic shield, which made it necessary to wait till they were sure no enemy ships were near, before turning off the shield, for the magnetic field affected the light.

The mirror was made of fused silicon dioxide, or quartz, and silvered, as our mirrors, by chemically depositing metallic silver from a solution of a complex tartrate, reducing by means of a mild reducing agent, such as sugar.

The mirror was approximately twenty feet, or 240 inches in diameter, and the powerful lenses were able to make a space ship visible as it left Sator, although the tactical uses of the telescope were practically *nil*, for merely painting the ships black made them quite invisible.

There were half a dozen assistants with Tharlano at the observatory at all times, one busy with the great files of plates that were kept on hand. Every plate made was preserved in triplicate, lest they be destroyed in a raid. The original was kept here, and the other copies were kept at two of the largest cities. It was from these files of plates that Tharlano had gathered the data necessary to show Arcot which universe was his.

Tharlano was proudly explaining the telescope to Arcot, realizing that the wonderful telectroscope was far better, yet this was indeed a triumph of mechanical perfection. Arcot and Morey were both intensely absorbed in the discussion, while Torlos, less interested, was examining the observatory.

Suddenly he cried out in warning, at the same time leaping wildly, and covering fully thirty feet, gathered Arcot and Morey to him in his great arms. There was a low, but distinct noise of a pneumatic pistol and the thud of a bullet, and Arcot and Morey each felt Torlos jerk!

Quick as a flash, however, Torlos had whirled them behind the great tube of the telescope, and leaping over it and across the room, he had quickly disappeared in the supply room. Suddenly, there was the noise of a scuffle; again the noise of the pneumatic pistol, and the sudden tinkle of broken glass. Then suddenly the figure of a man described a wild arc as it flew out through the air, and landed with a heavy crash on the floor. Instantly Torlos was leaping after him, and while a trickle of blood ran down from his left shoulder, he gripped the man in his giant arms, pinning his arms to his side. The struggle was brief. Torlos simply squeezed the man's chest with his arms; they could see it bend! then in a moment the man was unconscious.

Torlos had stripped from him a leather strap that formed part of his harness, and bound his legs with it, wrapping it many times around the ankles, and was picking him up when Tharlano arrived. Immediately behind him came Arcot and Morey. Torlos was smiling broadly.

"One Satorian spy that won't report. I could have finished him when I got my hold on him, but I wanted to take him to the Board for questioning. I just dented his chest a bit."

"Well, we owe our lives to you again, Torlos. It is becoming habitual with you it seems," said Arcot, gravely. "But this time you ceratinly risked your life; that bullet might well have penetrated your heart, instead of striking a rib, as it seems to have done."

"What is a rib?" asked Torlos, curiously.

Arcot looked in amazement, then quickly ran exploratory fingers over Torlos' great chest. It was smooth and solid. Certainly he had no ribs. Arcot told Torlos to feel his chest, and when he saw the look of amazement in his eyes, he took a deep breath, expanding, and separating the ribs.

"Morey—these men have no ribs! Their chest is as solid and smooth as the skull; it is a bell of metal! No wonder they are hard to kill. Torlos was taking far less chance than would an Earth man. These men are equipped by nature with a solid steel vest, front and back, and very effectively bullet-proof. No wonder they don't use rifles! The hands of a man like this are deadly, and there is no vital organ that you can reach without shooting through a layer of metal; they can't be killed instantly, and just let them live thirty seconds, and they will have revenge. They will certainly live that long! Their vital organs are all shielded in metal; they are certainly a deadly enemy!" said Arcot in surprise.

"What—no chests! How do they breathe?"

Arcot laughed, and replied with a question. "How do you? Don't strain your chest to a deep breath, just breathe naturally—you don't use your chest, you see, but the diaphragm and the abdominal muscles. A man normally breathes that way, although a woman does use the ribs. So why should these men have ribs? We have them and don't use them; these men have not only better protection, as we have seen, but greater strength,

. . . It grew with each crash, till a dozen ships had fallen into it—it was a new broom and it swept clean!

for the arch and the sphere are the strongest types of construction."

"But the question in hand is, who is this man?"

Torlos answered to the best of his ability, that he was undoubtedly a Satorian spy, sent to murder Arcot and Morey. He had glimpsed the muzzle of his pistol as he was about to direct it, and had at once intercepted his shot, with the observed and pleasant results. The damage done by the bullet was, he said, about equal to scratching the paint off some machine—merely bothersome. It was evidently very nice to have a bullet-proof chest!

ARCOT and Morey decided that they had best return at once to see that Wade and Fuller were still safe, and the Satorian was hastily bundled into the ship, tied further with a lux metal cord, thick as a string, with two loops. Torlos looked skeptically at it. "He will break that when he wakes, without knowing." He looked again at the thin, transparent thread. "You forget the strength of Nansalian and Satorian men."

Arcot smiled, and wrapped the cord once about Torlos's wrists. Torlos smiled and pulled. That's all he did. His huge muscles bulged and writhed in great ridges along his arms. He strained, but the thin cord was undamaged. He stopped, panting. In an instant he was breathing normally. "That cord is something different," he smiled, "and I will make no more comments on the things I see you do." Lux metal was not easily to be broken, as Torlos now realized.

They returned to the capital at once now, going at a rather high rate of speed, for Torlos was anxious, and felt that there might be some significance in this attempt to remove Arcot and Morey. Wade and Fuller had been warned by radio, and had immediately retired to the council room of the Three. The members of the Investigation Board joined them for questioning the prisoner.

When Arcot and Morey arrived, Torlos carrying the man in, helplessly bound, and exceedingly violent, struggling with his shackles. He had broken the heavy belt almost as soon as he came to, and Torlos had been required to hold him, but the thin, almost invisible lux cord had held him securely. Arcot applied another to his legs. Now he was secure.

The Nansalians questioned him without result, for he merely said nothing—that is nothing helpful. Eventually they were forced to give up in disgust. They were further worried, as they had been receiving, *via* radio, signals from Sator in code that they knew must be signals to spies.

"May I try my luck?" asked Arcot. "I will try the mental telepathy. If I can get his attention with my eyes, I believe I am powerful enough to force him to remain looking at me." Gladly the Nansalians assented.

Arcot came over as though to inspect the prisoner. For an instant the man was looking defiantly into Arcot's eyes—then suddenly an expression of amazement and fear crept over the man's face as his eyes remained helplessly fixed on Arcot's blazing eyes. Arcot's practice in telepathy had made him exceedingly powerful now, and the man was as helplessly bound mentally, as the lux metal bound his arms and legs.

For a quarter of an hour Arcot stood glaring into the man's eyes. Then he turned, shook his head, and sat down, tired.

"Some job, Morey! I am so tired you will have to tell them what I have found out. I can't communicate with them. I have a terrific headache already. He was fighting me all the way, and toward the end his brain became so confused and muddled that I couldn't learn anything; he was nearly crazy, I think.

"But Torlos was right. They were trying to get rid of both of us, and Wade and Fuller, too, for we are the only four who can operate the ship, and that ship is the only defense against them.

"This man did not know what the new weapon is; it seems they are telling practically no one, not even their own men. But that an attack is planned, and soon, is evident. He didn't know when. We can only lie in readiness, and do everything to help these men with their work. Tell them what I have found out, will you?"

"Arcot," said Wade, "they had a lot of workmen bring about twenty tons of lead wire on board this evening, and the distilled water tanks are full. Oxygen is plentiful, they even gave us supplies of food, such foods as we can eat, and a lot of spare parts for the ships. We are fully stocked for a long trip! We can leave any time. The Three said that it was their first consideration that we should be able to return to our homes.

"I made up one projector, to which they can supply power from their regular power station. We didn't have enough time to make any more, but this one will be able to give the Satorians a hot time, if they come near it. As it works nicely through the magnetic wall, they have mounted it on the roof of the central building."

Morey had been telling the Three what Arcot had learned from their Satorian prisoner, who was now unconscious. The message had made a great impression on the Nansalian council—that was evident.

"I think we had best go back to the *Ancient Mariner* and get some sleep; then we will be more nearly ready for whatever may happen. We can ask Torlos to stand guard, and call us in case of attack," suggested Arcot.

"Excellent! I feel as if I needed some sleep. These sleepless men make me feel as though I were lazy. They work for forty or fifty hours and think nothing of it. Then they sleep for five hours and they are ready for another long stretch. They certainly are some workmen!" said Fuller, yawning and stretching.

Arcot asked Torlos if he would stand guard on the ship, while they got some much needed sleep. Torlos consented readily, with the permission of the Supreme Council.

The Terrestrians returned to the ship under heavy guard, and each was carrying a ray pistol now.

Gladly they threw themselves down on the bunks, taking off only the more uncomfortable articles of clothing, for they expected an attack almost momentarily.

It was seven hours after they had gone to sleep that it came. Through the ship came the low hum that quickly rose to a dull, booming call of danger—the warning. Torlos was calling them, but already they had heard the sound as it was retransmitted to them from the loud speaker. They were dressing quickly.

THE Nansalian fleet was already outside, and hard at it. The fight was on! But Arcot saw even now that the fight was one-sided in the extreme. Ship after ship of Nansal seemed to burst into sudden, inexplicable flame, and fall blazing against another of their own ships. It seemed as if some irresistible attraction was drawing one ship to the next, while the Satorian ships flew far off to one side, doing nothing, it seemed, but dancing about to avoid the rays of the Nansalian ships.

"Torlos—go out—we can work better when you are not here—you are exposed to danger of magnetic rays, which we need not fear. It will be safer, and gives us a freer hand. I don't like to make you miss this, but it's for your world!" said Arcot, as he ran into the control room, where Torlos was watching anxiously, buckling his ray pistol belt about him, as he ran over,

and dropped into the control seat. Torlos showed his disappointment. He wanted to be in this battle, but he realized that what Arcot said was true. These strange men with their weak, stone bones, were completely immune to the effects of the most powerful magnetic ray. Quickly he was replying, then he turned, and ran down the hall, and to the airlock, and was out.

"I'll go—may you have good luck, and wipe them out for me—I suffered with them for many years—now it is time I got a lick at them, so give them mine!"

Outside now, Torlos was waving to him. It was sunset, and the sky was red with the blood colored light of the great day-star. Then Torlos turned, and ran quickly into the great central building and was out of sight.

Wade and Fuller were already at their ray positions, and Morey called from his in the rear that he was ready. It had required less than one minute to get into action, but in that minute the forces of Nansal were surely defeated! The ships seemed suddenly to leap up in violent, glowing light, then to fall swiftly toward nearby ships, and strike them with terrific force, fusing them, and crushing them, while about them flamed a great flare of light, a gigantic electric discharge.

The magnetic rays seemed helpless, and though many ships of Sator went down, more ships of the Nansalians were going, and every ship increased the odds. Whenever a Satorian ship struck, there was a great roaring column of fire, and a crashing boom of some titanic arc. Then there was a spot of fused metal.

"They've got something!" said Arcot, as he drove the *Ancient Mariner* up and into the battle. The molecular ray on the roof of the Central Building was useless, for their own ships were so inextricably mingled with the Satorian, that it was impossible to use it.

Arcot was at the magnetic wall now. "Hold on!" he called, and they had struck it. The ship reeled, and sank suddenly planetward. Then it was standing almost motionless, but was through the beam.

The rooms were suddenly hot, oppressively hot, and the molecular cooler was struggling to lower it. "Made it!" yelled Arcot, triumphantly. "The eddy currents induced in the relux wall generated a lot of heat, though!"

They were out of the city now, and speeding toward the battle. Following the prearranged system, all the Nansalian ships retired and left Arcot with a free hand. He needed no help!

Suddenly from the bow, a molecular ray broke out. A Satorian ship was suddenly leaping sidewards, straight for its neighbor—there was a terrific crash and the two ships fell, a molten mass of metal, while all about in the air were flying stars of burning metal. Another ray reached out, and another ship was diving. Then Wade and Fuller got together—Wade turned his molecular ray on one ship, and Fuller used the cosmic ray. Like some titanic broom they swept it about at dozens of miles a second, leaping, twisting, shooting from ship to ship, and like a snowball, it grew with each crash, till a dozen ships had fallen into it—it was a new broom, and it swept clean!

Then a magnetic beam caught the leaping ship. Arcot had kept the *Ancient Mariner* leaping in a way that belied its name. The magnetic beams had been outdistanced. But suddenly the ship was caught. With a shock it slowed down at a terrific rate, then Arcot turned on more power, and magnetic beam or not, he merely dragged the other ship along with him! In a second the other ship had been torn loose, and the *Ancient Mariner* was again sweeping about, but the mighty blazing mass of metal that had been Wade's broom, was gone, and was a glowing mass of metal on the ground.

"We haven't seen that new weapon yet," called Morey.

"Can't find us!" replied Arcot, for the blazing red sun lighting the ship, made it seem like a ball of fire when still, and in motion it was a mere flash of red, a streak of red light.

Ship after ship of the Satorians was going down before the three beams of the Terrestrial ship, and the great fleet was being disintegrated like a cake of solid CO_2 in a furnace, disappearing!

Suddenly Wade cried out in surprise—ahead of them, a Satorian ship was driving at them with obvious intent to attack; if his magnetic beam caught them, and drew him to them, there would surely be a head-on collision.

A molecular beam caught him. Another blazing wreck lay on the ground below.

The ship was going once more, free of its enemies, for the reason that none could catch it. Time after time the ship would suddenly swing with the force of an invisible magnetic ray.

"All rays off!" called Arcot. In an instant they were off, and the next second the *Ancient Mariner* had vanished.

"A moment's rest. Feel as though I need it. They will be looking for us for a while," said Arcot, as he drove the now invisible ship up two miles above the battle. Below the Satorians were searching wildly for the ship. They knew it must be near, and feared to see it materialize directly before them with its deadly rays. For one minute Arcot hung here, while the ships below twisted and turned, wildly seeking him. Then they formed again and started for the city.

"Our turn now!" called Arcot. The ship dropped like a plummet, and the ray operators prepared to sweep the front with their beams.

SUDDENLY the *Ancient Mariner* was visible again. Simultaneously three rays leapt down and bathed the front in their pale radiance. Fuller was using a molecular ray now. The front vanished, and the line broke, attacking the ship that hung above them now. Suddenly, four magnetic beams found Arcot simultaneously. He could not pull away from all four, and it was impossible to tell what ships were sending them.

All at once the men felt a violent electrical shock, and the air about them was filled with the blue haze of the electric weapon they had seen!

Simultaneously, the magnetic beams left them, and they saw, behind them, and coming swiftly on, a single, Satorian ship, surrounded with that same, bluish halo of light.

"Suicide ship! Get away, Arcot!" called Morey.

But Arcot had already thrown every possible unit of acceleration into the attempt—there was a limit to what he could use, for they could not endure above a certain limit. The Nansalian ship was accelerating also. A molecular beam reached out and touched it. It reeled, and stopped—they were escaping. Then it was frost-covered, a ship of the dead, but still coming! Morey could not get more force from it now, for the molecules were already still. Arcot turned and went off to the right—but like a pursuing Nemesis, the strange ship came after them, in the shortest, most direct route!

"Still coming!" called Morey in alarm.

"He will reach us, too—it's hopeless now!" called Arcot. He put on more power, but the drag of the pursuing ship was evident now. They were rapidly nearing it, and with an ever-increasing acceleration, though they scarcely felt it. In horror Morey saw the ship rushing at them ever faster and faster—accelerating with amazing speed.

Suddenly the two envelopes of blue light had touched—they coelesced—then Morey turned away as a great blinding arc seemed to leap from the *Ancient Mariner*,

coming from all over the ship—and a tingling shock ran through the crew.

A cosmic ray reached out and touched the approaching enemy ship, as Arcot called for it. There was a sudden crashing arc, and then it was looming gigantic—Morey ducked automatically—then he was hurled against his seat-straps with terrific force. They had met—there was a rending, crashing roar in his ears—he saw a world of flame—then all was darkness.

Minutes later, it seemed, he awoke. He saw, far below them, falling swiftly, a great glowing mass of metal. The smooth window behind him was glowing red. Arcot was calling him.

"Morey—Morey—are you all right?" There was a note of worry in his voice.

"O.K., I guess. Everybody up there safe?"

"Wade passed out—but he has recovered now. That lux metal saved us. It wouldn't break, though their ship was splintered and crushed completely, and the temperature of the arc didn't bother it. Further, the arc was weakened by the fact that the lux shell wouldn't carry current, and the air around the shell had to carry it, with the result that the arc was weakened by the resistance. But I am now anxious to convince these people that this ship isn't made out of any substance they ever heard of—come on now and we'll give them a real show," said Arcot grimly.

It was a show, a show that warmed the hearts of the Nansalians and overwhelmed the Satorians, who were crushed completely. It was impossible to fight this ship. It was only when they could concentrate four rays on the ship, which was sheer luck—that they could hold it to make their weapon effective, and then it didn't harm the ship; they merely lost a ship themselves.

They saw ship after ship of their fleet suddenly crumple under the molecular ray, or shoot suddenly Nansalward, and break over the soil. They were helpless. Wisely, they tried to flee out into space, a rear guard of suicide ships was left for the purpose of stopping Arcot. These ships were merely magnetic ray ships as Arcot soon found, and he suddenly shot toward one of them. The magnetic rays were on the *Ancient Mariner*—then Arcot had swept the ship to one side with the molecular ray, and was through the guarding group of ships.

"I want some specimens to see how these ships are made, and what their weapon is. I am going to capture two of them. One for our own investigation, and one for the Nansalian scientists."

Arcot was racing out toward the ships now. They were fleeing ahead, and using a higher acceleration, for their men could withstand it. With a start of nearly ten miles, they were rapidly escaping.

"Looks as if we won't get them at that!" said Morey.

"Wait and see!" called back Arcot grimly.

On they flew at full speed. On and on, out miles into the cold of space. For twenty-five thousand miles Arcot followed, then he said to Morey, who had joined them, "I think we will catch them now." He smiled, and pushed a little red switch for an instant, then opened it, and started braking the ship to a lower speed. A moment ago Nansal had been a great disc behind, now it was a tiny moon, a full million miles away.

It took the Satorian fleet nearly an hour and a half to reach them. Arcot had stopped now, and was actually falling back toward the planet. The fleet appeared as dim points of lights in the telectroscope. Then they were coming rapidly nearer. Arcot had extinguished all lights, and as the Satorians were approaching from his "night" side, he was a black body, and quite invisible.

Two rays reached out, invisible in space. Two ships suddenly halted. Two other rays reached out, and the ships began to move once more, back toward the planet they had left. In wild panic the remainder of the fleet spread out all over space—they were fleeing madly from this impossible ship that could so seemingly be in two places at once, for now they knew it was ahead of them, and standing there, waiting! They knew there was but one such ship—and they thought they had left it far behind!

It was several hours later that Arcot and his friends approached the planet again. They had some difficulty in locating the city, but they found it. They knew it had been dusk as they left, so it must now be in the shadowed part of an eighth of a revolution.

They found it by the blazing lights that were illuminating the battlefield. Men were working there now. They were examining the wrecks that had fallen, recovering bodies of their men, and examining the machines of the enemy. But it was hopeless. The weapon destroyed itself on crashing.

The lookout discovered Arcot when he at last directed the rays of his searchlight down on the field. The ships he had brought with him, supported on the combined molecular and cosmic rays, were slowly lowered, and then the scientists were flocking to them.

Long and needle-shaped they were, in form exactly like the standard ships, but there were two differences. These ships had two great circular windows, one on each side and made of foot-thick glass or fused quartz. In the center of these windows was a rod. These were evidently silver, equipped with some magnetic device. Arcot looked at them.

"Those are the weapons, all right." There were a number of scientists of Nansal about him. Torlos walked up and asked Arcot how they might enter. The great steel doors could be opened only from the inside. How were they to enter?

Arcot looked at the walls of the ship. He put his hand on the heavy butt of his molecular pistol, where it hung by his side. It would be easy to rip the ship open, but they might destroy what they most wanted to find. Arcot rose and flew lightly around the ship. Finally he paused at the great control windows. He drew his ray, and there was a crash; the window had suddenly leapt from its seating, fell out and smashed to a thousand pieces as it struck the rocky side of the little gully where they had landed.

"Can you get in now?" communicated Arcot.

"Easily, Arcot, don't need more than a ten-foot jump now!" replied Torlos. Already three men had leapt up. As the great steel door was opened from within, the scientists entered.

"Warn them to be careful—those things are not safe. They should know, though. They are scientists more acquainted with such things than I am!" Arcot smiled. Torlos looked about at the ship rather skeptically. "I hope so!" said he.

Morey and Wade suddenly landed beside Arcot, dropping out of the black night, landing softly.

"Shall we investigate our captive?" asked Morey.

"Let's start, and get over with it. Pull out the window with a ray."

"May I accompany you? I know the layout of these ships more thoroughly than you, unless they have greatly changed them!" suggested Torlos.

"Come on—there goes the window. You jump, and we'll fly up." Arcot gave a slight push, and rose in a long parabola that landed him gently in the control room. Torlos was suddenly beside him, landing with a muffled thump. Then, noiselessly, Wade and Morey were with him. Wade had a hand torch, and now the white beam of its light shot out, and the way before them was brilliantly illuminated. Torlos led the way. Down the narrow passage they went, through it all and into the engine room. Here the gigantic coils of the typical

Nansalian and Satorian ship loomed about them, where tremendous energy was stored. The coils looked strangely like a series of giant doughnuts strung on huge hoops, for while the magnetic flux was almost completely within the turns of the wire, in progressing in a spiral about the toroidal form, the effect was as of one single turn in a plane at right angles, so every line of force had been taken into consideration, and the individual coils were part of a greater torus. The giant magnetic projectors, arranged about the room, dwarfed the men as they walked between them. Here and there a silent figure lay on the floor, killed painlessly and instantly by the deadly molecular ray.

ANXIOUSLY Arcot threaded his way between the gigantic machines, knowing that vast magnetic fields were here, yet, because they were bound, they were harmless. He walked to where he knew the weapon they were seeking was located. He saw two huge cubes of silver, or maybe they were but cubical boxes of silver, and about them was wrapped layer on layer of wire, in a curious manner, which, no doubt, was the true secret of the apparatus. Arcot examined it minutely, while Morey joined him. Torlos was, in the meantime, entering the captain's quarters, and removing a number of valuable papers. He knew well that there would be no plans of ships or weapons here, but he knew that the ship had left the planet under sealed orders, and he hoped to find them.

"I think I know how—" Arcot began—then suddenly he was interrupted. The whole ship suddenly leaped violently; the machine rolled, and there was a sudden flash of light. A tremendous low rolling roar came through the open window of the ship, and a wave of heat seemed to come upon them. The great window, through which the heavy silver bar projectors were thrust, suddenly glowed red and slumped. Arcot, nearest it, dove suddenly across the room to escape an inrush of searing gas.

"Lord—the fools! They did something over there!" Even as Arcot said it, there was a second explosion. Then a tremendous hissing and Arcot suddenly felt the great metal ship leap into the air and roll over and over. Like peas in a pod they were thrown about the engine room, wildly clutching for a hold. Their weightless condition did not relieve them of mass, and it was some time before the ship came to rest, a veritable flaming Hades. They dove quickly for the corridor and they were racing out, calling Torlos. He did not answer!

"Out, fellows—I'll get him—one's better than three—there's going to be another explosion here, too! Tell everyone near here to beat it—magnetic field!"

Arcot was searching for the commander's cabin. At last he found it, next to the little radio room. Torlos was lying on the wall of the ship, limp, and obviously unconscious, if not dead. Arcot bent over him—but didn't know just where his heart should be. Quickly he bent, and, struggling under his load of nearly four hundred pounds, threw the limp body to his shoulder. Thereafter, it was easy. If you believe it easy to lift a limp, unconscious man to your shoulder, one who weighs four hundred pounds, try it some time.

With the aid of the molecular power suit, he ran lightly along the hall. It was easier to run than it might have been with a weight of about seventy pounds. Then he leaped through the window. He had been too hurried to look before leaping, and was settling already, when he saw to his astonishment that the entire outer wall of the ship was red hot and the ground beneath was dully red. The air was hot as a furnace. He did not breathe this burning air, but quickly, before he had sunk to the burning ground, turned on nearly all the power of his little unit. The powerful machine strained at the straps, and the creak of the bands seemed to indicate a prompt parting, but they held, and the two forms soared swiftly up and away from the burning ship. Arcot turned a cosmic ray upwards, and held it there, like a beacon, while he rose rapidly to nearly a mile.

A moment after he had stopped rising, the dimly glistening bulk of the *Ancient Mariner* loomed up out of the night, and Arcot shut off his ray. A moment later he was in the airlock, and had lowered Torlos to the floor. Suddenly the ship rocked violently; there was a terrific explosion from below. Simultaneously there came a flash of light that was more nearly a blast. An instant later, perhaps half a second, there was a low humming roar, and the ship was suddenly sinking with astonishing speed! Fuller, at the controls, turned in more power, and the ship started up. A moment later it was all over. The outer door of the lock snapped into place, the inner opened, and Arcot and Wade bore Torlos into his bedroom. They were at a loss as to the exact measures to follow.

"Cold water or hot, when dealing with a molecular motion man?" asked Wade, puzzled.

"Neither, rub him and bring a bottle of amyl acetate, and a bit of butyl cyanide. If the one pleasant odor doesn't affect him, try the other. If he doesn't stir then, it's a bad case. In the meantime, I'll rub his arms," suggested Arcot. Wade leaped down to the chemistry lab and returned a moment later with two small tubes. But Torlos was sitting on the edge of the low bunk, rubbing his head, and shaking it every now and again. Wade heaved a sigh of relief.

"We thought you were gone for a while!" he said in English.

Torlos had been picking up a few words, and understood him.

"Sao deed Yi!" he replied smiling.

Arcot communicated telepathically with him now. "We will leave you. You need to rest a while. I cannot give you any medicine, but we will go at once to the city!"

Arcot and Wade left Torlos lying down.

"Hello—we were mighty glad to see your signal there just now, Arcot!" called Fuller as Arcot entered the control. "Just look down there," he added, in a lower tone. The ship had dropped many feet now. They were but a short distance over the spot where Arcot had landed the two ships. The ground about there was glowing dully, and what was left of them was glowing brightly. But there were, outlined clearly against the red-hot rocks, figures that Arcot could recognize as having been human. They were grouped closely about the ships.

"Some of the disadvantages of iron bones," he said softly.

He realized that the ships had been in some way started by the release of the energy stored in that electrical weapon of the Satorians. This had blown up the first ship, heating, and hence volatilizing the liquid helium which was cooling the lead coils. The pressure increased and the temperature changed a little, but so long as there was liquid helium no great change could occur, save as the mounting pressure raised the boiling point. Then it had reached a point where, no matter how great the pressure, the helium was a gas and it had exploded. The coils of wire were no longer cooled. They melted instantly, and the magnetic field, with the vast amounts of energy in it was loosed, its energy forming an electric current in every conductor near it, and more dangerous, still, the straying lines of force now caught the iron bones of the unfortunate men near the red-hot ship. They had been suddenly yanked toward the destroyed and glowing ship, and—

THE heat had penetrated through the second ship, volatilizing the helium there, with a similar effect. The results had been complete destruction. The ship had rolled about while they were in it, rolling nearer the blazing ruin that had been the Satorian ship. The vacuum jacket had saved it for some minutes, but the metal softened in the heat; then it had burst, and the end had come quickly. Torlos had been badly hurt by the acceleration produced by the magnetic field, despite the shielding effect of the steel walls. The walls had absorbed much of the magnetic force, but not all.

"I can see what happened after the ships were landed —but I'd like to know how their weapons worked. They were even able to stop this ship," said Wade. "I have an idea—but I want your explanation, Arcot."

"Well, they have something that interests me scientifically, though it is not particularly useful now. They have found a way to cut off the electrical field produced by two charges, or perhaps to direct it. They have, at any rate, succeeded in separating the atoms from some of their electrons. They merely had two charges separated. The energy required was tremendous, but they had it done on their world where they could get the energy, and then just carried it along. It was electrostatic attraction. You can see what would happen if a ship were charged negatively, and the ship next were positively charged! Have you any idea of the magnitude of those electro-static forces? One coulomb is one ampere for one second, of course. Now if one coulomb of negative charge be put on a body, placed at a distance of 300 feet from another body, with one coulomb of positive electricity, the force of attraction, varying according to EE'/d^2 will be ninety billion dynes. Let us use more practical figures. Say we use the very obtainable figure of 100 coulombs on each. Then the attraction is practically one quintillion dynes. Do you know the charge on one gram molecular weight of iron ions? It is about 285,000 coulombs, and that is about two ounces of iron! You can see what a whale of an attraction that means!

"They located one of the charges on one ship, the other on the other ship, then the attraction of the ships pulled them closer. In a short time they had come nearer —and the attraction increased. In a while it was beyond control, and then the charges leaped across, and the giant arc was formed, for those charges represented energy all right. You don't get a pull like that without having work. The energy was enough to fuse the metal, no doubt, but the ships were already falling toward each other—they met—and the result is obvious. There they lie now. They were wrecked by less than a tenth of an ounce of ions, projected by some method, and lodged on the ships. The attraction was irresistible, as we saw. Why, if we were to put two ounces of iron atoms, or ions at the north pole, and an equivalent amount of chlorine ions at the south pole, the attraction, even across that distance, would be 360 tons!

"So it was ions that destroyed those ships, I am sure."

"The whole secret of the weapon was, of course, in the method they used for keeping the charges from acting on each other in the Satorian ships. They had some trick field that did it. I am sure I don't know how it was."

Arcot stopped. "Well—shall we go? We have done enough here for a while, I think." He paused, and looked at the still glowing wreckage on the ground.

"We did more damage with those two ships than the Satorians did with their entire fleet," said Arcot bitterly.

They turned and went hurriedly to the city. The magnetic wall was lowered and they entered, making their way directly to the central courtyard. They at once called a Nansalian physician to care for Torlos. He would be well in ten hours, the physician assured them.

But Arcot was almost surprised to see that the Nansalians still thought him their greatest friend—after all the damage those ships had done! They had lost many men and many scientists. But the Nansalians were reasonable. Arcot and his party had examined their ship without any trouble; it must have been the fault of the Nansalian scientists that the ship exploded. And these Terrestrians had saved the entire city, for Torlos had rescued the orders. They were very brief and very definite. They were to attack the cities in succession—naming the largest and most vital cities of their world—and destroy them. With the fleet wiped out, a break could be made in the magnetic wall, and they would enter—pouring down their explosives and their magnetic rays, and the electric weapon would have come into action.

The Terrestrians were anxious to leave, but the Nansalians did everything in their power to urge them to stay.

In the Council of the Three, Arcot was officially invited to remain with them. The fleet of molecular motion ships was nearing completion—indeed, the first of the ships was to be ready the next day—but they wanted Arcot and Morey and Fuller and Wade to remain.

"We have a large world here, and at last we can call it ours, thanks to you. We offer to you, in the name of the people, the choice of any spot of this world. And—we give you this!" The spokesman, or thoughtsman, of the Three came forward. He had a disc-shaped plaque, perhaps three inches in diameter, made of a deep ruby red metal. In the exact center of this was a green stone, which seemed to shine of its own accord, with a clear, pale green light; it was transparent and highly refractive. About it, as at the three points of a triangle, were three similar but much smaller green stones, There were lines engraved on the metal and the three stones were three corners of a regular tetrahedron, and the green stone, perhaps the size of a pea, was the apex, or fourth corner. There were characters engraved at each point of the tetrahedron, in the language of Nansal. And around the edge were other characters, for the disc was perhaps a quarter of an inch thick. Arcot looked at it in amazement, and turned it in his hand. On the back was a miniature map of their solar system. The center was a pale yellow stone, cut and faceted in a thousand faces, and each seemed to have a separate life. Around this were the orbits of planets, and each was marked by a little or large stone, one red, one yellow, and one white—till all of the eleven planets had been represented. Here, too, were characters.

The Thoughtsman was holding in the palm of his hand another such disc, slightly smaller, and on it there were three green stones. One of these was a bit larger than the others, but none were as large as the apex stone on Arcot's plaque.

"This is my badge of office as Scientist of the Three. The stone marked Science is here larger."

"This plaque," he pointed to the disc in Arcot's hand, "is new. Henceforth, it shall be the Three, and you, or your successor, shall be the Coordinator. Your vote shall outweigh all but a unanimous vote of the Three. To you our world is answerable, for this day you have saved us.

"And when you return, as you have promised, you shall be the Coordinator of this system!"

ARCOT stood silent for a moment; this was a thing he had never thought of. He was a scientist, and knew that his ability was limited to that field. At last he smiled, and replied:

"It is a great honor, and it is a great work. I cannot

spend my time here always; I must return to my planet. I cannot be fairly in contact with you. I will make my first move in office now, and I suggest that this signify not the Coordinator, and first power of your country, but your First Friend, and Counselor in all things in which I can serve you. The Tetrahedron you have chosen, so let it be. The apex is out of the plane of the other points, and I am out of this universe, but there is a relationship between the points and the apex, and this relationship and these lines will exist forever.

"We have been too busy to think of anything else as yet, but our worlds are large, and your worlds are large. Commerce can develop across the ten million light years of space as readily as it now exists across the little space of our own system. It is a journey of but five days! And later machines will make it less. Commerce will come, and with it will come close communication. I will accept this on the understanding that I am but your friend and advisor. Too great power in the hands of one man is bad. There might be an unscrupulous successor, even if you trust me wholly.

"And I must return to my world.

"I had intended going today. Your first ship will be ready tomorrow, and when it leaves the ways I will leave your planet, for I want to return to my world. I will return to this world, though. We are ten million light years apart, but the universe is not to be measured in space any longer, but in time. We are five days apart. I am nearer to you at all times, than is Sator! I will come, and others of my race, if you wish it. But if you wish that they shall not come—they will not. I alone have the photographs of the route, and these I can lose."

For a moment the Three spoke together. Then again the Scientist was thinking to him.

"Perhaps you are right. It is obvious that your people know more than we. They have the molecular powers, and they do not have wars; they do not destroy each other. They must be a good race, and we have seen excellent examples in you. We ask that you come again, for we can realize your desire to return to your home. We will remember that you are not ten million light years, but five days, from our planet."

Then plans were laid as to the things that the ships of commerce should bring. It seemed strange to be laying plans for such a trip!

But the conference was ended, and Arcot and his friends returned to their ship. Torlos was awaiting him. Already it had been announced on the radiocast that Arcot had been given the new position, and his reply was broadcast.

"About—haow saon you laive?" asked Torlos in his English.

"Why—tomorrow."

Torlos reverted to telepathy. "Arcot, I have seen my world; I have been living here. For two days it was Heaven, but Arcot, for ten long years I pictured it perfect; it is not. I have built too high an ideal, Arcot, and I want to go far away and build a new conception of my world, that I may be happy when I return. Arcot, can a man of Nansal visit Earth?" Anxiously, hopefully, and hesitatingly he asked. "I can come back when you return, perhaps, or I can come with one of the commercial ships. And I think I can earn my living on your world!" He half smiled, but he was too earnest to make a perfect success, as he flexed his giant muscles.

"And I would perhaps prove that what you said was true!" he added.

Arcot was amazed. It was an idea he would very much have desired to see fulfilled, for the idea of metal-boned men, of tremendous strength, and strange molecular motion muscles—that would inspire no friendship, no feeling of kinship, but the man himself, a pleasant, kindly, sincere man, an intelligent giant, he would be a far greater argument for the world of Nansal than the most vivid orator would be!

Arcot called the rest of the men at once, and explained Torlos's plea. The vote was unanimous—let him come!

Arcot alone proposed one difficulty. Torlos had become somewhat accustomed to Terrestrial foods, but would the long sojourn be good for him. And who could take care of him if it were not? There were no men on Earth who could treat him.

"But," objected Torlos, with a smile, for he felt his case was won, "we will be no further from home than we were when you picked me up on Sator—no further in time!"

"Oh—my own arguments!" grinned Arcot. "Well, if you're willing to take the chance—come along!"

The first of the molecular motion ships was ready shortly after sunrise the next day, approximately twenty-eight hours after Arcot had announced his intention of leaving when it was completed. The *Ancient Mariner* and many other ships were there. Arcot was aboard the new ship. He was to raise it into space. There the Nansalian operators would take it over, for they were going on the very excellent principle that, if they were far enough from everything, they couldn't wreck the ship, and the meteor guard would prevent them from hitting anything dangerous out in space.

For three hours Arcot trained one pilot. He trained him by having him land again and again on a small planet, after he had learned the "feel" of the controls in open space. Then he was ready, for this one could train others. He had done his work.

Arcot and his friends returned to Nansal now. They were to sleep once more here. Then—home!

The sun was shining in warm light through the windows of their rooms when they woke. They could hear Torlos below. He was struggling with the English language Arcot had taught him to read. They heard him get up and move about.

"Torlos—we'll be going soon—are you all ready?" asked Arcot, dressing.

"Pearfactly, Ahcut. Tse soonah tse better."

It was not long. The Three were there, and the Council of the Three, in the courtyard, and near them rested the graceful hull of the Nansalian molecular motion ship. It, too, was made of lux and relux, and only in its smaller size did it differ from the *Ancient Mariner*.

Arcot had given them the secret of the space apparatus, but this was as yet beyond their mathematics. They had been unable to follow its development, and had wisely refrained from merely aping the machine Arcot had made. They would make it theirs before they completed it.

FIVE hours saw them out of the galaxy. Twelve hours more and they were heading for home at full speed, well out in space.

The universe was looming large when they next stopped for observation. Old Tharlano had guided them correctly. They were home!

THE END

Moon People of Jupiter

By Isaac R. Nathanson

Author of "The Passing Star," "Conquest of the Earth," etc.

DEAN SWIFT'S task in writing his "Gulliver's Travels" seems to us to have been almost a simple matter, compared to that which faces our modern writer of scientific fiction. With all our many marvelous inventions, which enable us to get almost anything, or go anywhere with a speed and ease which would have seemed miraculous to people even fifty years ago, a writer's mind must necessarily be taxed to the utmost in picturing a people many times further advanced than we. It adds to the plausibility of this very interesting story to set its action in the atmosphere of one of Jupiter's moons.

HERBERT LOWELL and I were in his laboratory the day after our amazing feat had thrilled the entire world. The name of Nelson Bond was linked with that of Lowell in in a tremendous amount of public acclaim.

In all the long history of man's striving for knowledge and mastery of the universe around him, there never was anything to compare with our astounding achievement and its marvelous possibilities. The news had astonished everyone almost to the point of disbelief. After years of intense effort, Lowell's great genius had finally perfected the space-traveling mechanism, which had given us our first successful trial flight into the vacuous reaches of outer space hundreds of miles beyond the earth's last trace of atmosphere. Henceforth, our planet earth was destined to become a small place indeed—a mere local stop in the immeasurably larger domain of the solar system and beyond.

"THE next thing for us, Nelson," Lowell remarked to me, "is a vessel large enough for a flight to the moon or one of the planets and back again. I know I can do it if only we could find a way to finance the project." His luminous hazel-brown eyes gleamed hungrily.

"It does seem that we should be able to utilize this vast amount of public interest we have aroused to the extent of financing such a wonderful undertaking," I ventured.

"Ah, if we only could. Surely——" and he broke off in a brown study.

* * *

TWO years and three months went by. At last, after a tremendous amount of labor and effort, with hope and promise of success alternating with failure and despair, a company was organized, with the influential George D. Bond, my father, as president and active financial organizer. The necessary capital was paid in and our great dream was on the way to actual realization.

The huge space ship was nearing completion. Under the direction of Herbert Lowell and working according to his intricate and minutely laid out plans, a small army of experts in many callings were laboring by day and night. There it stood, gleaming in the sunlight, a thing of power and beauty to behold.

The "Martian," as we had named it, was of immense size and carrying capacity, as was necessary for such a stupendous journey as contemplated. It was six hundred feet long and one hundred and twenty feet wide. Its bulging fusiform sides and top tapered gracefully forward and aft, the bottom was somewhat flattened.

Illustrated by PAUL

"Forced to defend ourselves, we fired as we ran, killing many of the little people."

In the middle of the top and slightly to the front rose the main control and navigating room, partly resembling the conning tower on a submarine, the low walls slanting and curving into the general surface of the ship. All around the ship, top and bottom, circular portholes were spaced, for light and vision, protected with enormously strong, specially made glass, and reinforced with thick steel shutters controlled from the inside. The outside surface was of smooth toughest armor-plate steel, capable of turning a high velocity armor-piercing shell. This was necessary to ward off possible blows from large meteorites or other bodies moving with celestial velocities. Inside, the thick walls were properly insulated against the intense cold of the absolute zero of space. There was a main entrance on either side of the ship, also several small airtight entrances for emergency only. Two score stubby cushioning projections on the bottom supported the ship on the ground, more as rests than for any other reason, as a landing or take-off, if properly handled, could be controlled as gently as a feather with scarcely a jar.

The power principle by means of which the ship was able to leave the earth was based on the laws of electro-magnetic attraction and repulsion, which was called into play on a most powerful scale. Under the tremendous excitation induced by the Lowell gravity-repulsion generator, the force was so great that it drove the space ship away from the earth—just the opposite to the action of gravitational attraction. In fact it seemed to do just that: to reverse the normal attraction of gravitation into a repulsion force. Responding to the enormously powerful electro-magnetic field thus created, the space-ship was able to leave the planet rapidly and at a fast accelerating rate yet did not require the enormous initial velocity of seven miles a second, the critical velocity of escape from a body the size of the earth. This rendered the first upward rush safe and comfortable, for the power of the initial rise could be kept under control to any desired degree. Propulsion in any direction was obtained by the reaction of a highly compressed explosive gas directed from cylinders placed on the various sides of the ship. Once the heavy layers of air were left behind, great velocity could be attained in a short time and in the vacuum of space it would be virtually self-sustaining.

A number of trial flights of several thousands of miles into space had soon proven the "Martian's" fitness for a long interplanetary voyage.

The great space-ship was named, the "Martian," in honor of the planet Mars; as after careful deliberation, Lowell and I had decided on the ruddy planet, so much in the popular mind, as the first object of our interplanetary conquest.

"Mars is fast approaching opposition," Lowell had expressed himself. "It will approach the earth within about 35 million miles. Its comparative nearness and great brilliance will be more in the public eye than it will be for the next fifteen years. Let us go to Mars, and settle once and for all the question whether there is life there or not."

So it was agreed.

CAME the day when all was in readiness for the epochal achievement—when Man was about to become something more than mere Man, but something almost god-like in his power to break from his earthly chrysalis, and go forth from the confines of the planet which had given him birth.

Mars was now at its nearest, its ruddy orb a brilliant spectacle in the night sky. The usual public interest aroused by its occasionally near approach was immeasurably increased by the widely heralded news of our great adventure, and interest was at fever pitch.

A crew of ninety had been carefully assembled to man the "Martian;" also twenty scientists, astronomers, physicists, chemists, geologists, botanists, zoologists, along with sportsmen and famous explorers; all told, one hundred and ten souls. Each knew his allotted task. Herbert Lowell was the commander of the entire expedition, with myself as captain and second in command, and Richard T. Harkness, famous navigator and explorer, as lieutenant and third in command.

On that great day which marked our final departure, an immense concourse of humanity had gathered by the hundreds of thousands from the far corners of the compass, to witness the epochal take-off of this modern Columbus for one of the stellar bodies in space, hitherto believed forever shut out from the power of man. A small army of police and soldiers had been called out for the occasion, and every precaution was taken to prevent any untoward accident. Souvenir vandalism we did not fear, for the smooth, steel walls of our vessel were poor stuff for that. The sole entrance to the inside was closely guarded.

On board was an ample supply of food and water, and supplies of all sorts, sufficient for a two-year journey. In addition to the artificial air-purifiers, we carried a large supply of oxygen and other chemicals, as well as raw materials of the most diverse kind. Our equipment included four air-tight, armored autos, two of them with caterpillar tread for exploration on land, as we expected some rough going on the planet Mars. Also, should flights on Mars be found feasible, we were equipped with two airplanes, one of which was my private all-metal sports monoplane, both specifically fitted with rapid firing guns in case of unlooked for danger. Every soul was equipped with an air-tight, flexible suit, with a small air and oxygen tank on the back, to be worn on short trips after we landed, in case of a possible lack of sufficient or proper air. As an extra precaution, the entire expedition was well armed; our stock of arms included revolvers, repeating rifles and machine guns, and even boasted of two quick-firing field guns.

Everything was in readiness; everyone at his post. The last box had been hoisted on board; the last final round of inspection under the critical eye of our commander, the last good-byes; the entrance sealed; the portholes screwed hermetically tight—everything was ready to the last possible dot, before Commander Lowell nodded the signal to start.

The throb and pulse of the mighty repulsion engines sounded louder and louder; the shouts of the multitude outside sounded distantly through the impervious walls of the space-ship. At the final signal, the great repulsion generators roaring deafeningly, the great space-ship began to shiver and palpitate, and began to lift gently upward; and with the roar of the engines turning into the crescendo of an ear-splitting shriek, the "Martian" rose up and up, drove ahead and rapidly disappeared from sight.

CHAPTER II

SIX hours later we were still spinning out and away from the earth, and steadily gaining velocity. Our instruments showed we were well over twenty thousand miles away, and now moving with a steadily increasing velocity.

Save for the brilliant stars and blinding sun, all around us was silence and darkness. The earth hung below, huge and round, the outlines of the continents showing here and there, hazy and very indistinct. We seemed hung motionless in space. There was nothing except our acceleration that to the senses would indicate movement. Overhead and to our right was the brilliant crescent of the new moon, looming unbelievably large

and bright. In front of us, the nose of our space-ship pointing straight in its direction, the ruddy glow of Mars beckoned us on. The scene was indescribably beautiful.

In twenty-four hours, as reckoned by our chronometers, the "Martian" was leaving the earth-moon system rapidly behind, our ace having attained a velocity of seven miles per second. The electro-magnetic repulsion engines were long since turned off and silent, not needed at this great distance; the propulsion cylinders driving us on at an ever-increasing rate, adding speed to our progress being almost their only work. The acceleration, though steady, was gradual, as such great velocities go; for a too sudden increase would be dangerous and result in death by the rupturing of blood vessels or what not.

Every movable object on board had a bottom that was magnetized to keep it from moving aimlessly about in the gravitationless surroundings. Even our shoes were thus properly fitted in order to hold us down; the iron or steel floors acting in place of the accustomed gravity on earth.

Eight hundred thousand miles away, the earth had shrunk to the apparent size of the moon, although it appeared much more colorful and more brilliant on account of its superior albedo, the ratio of the light falling on it to that reflected from it; while the moon appeared tiny and small. We were now at the practical limits of the earth's gravitational field, and were coming within the direct pull of the sun, which, of course, for a body the size of the "Martian," was inappreciably small. The gaseous stream from a few of our stern propulsion cylinders was therefore able to drive our vessel on at a faster and faster rate; for with the total lack of friction which exists in space, and outside of the faint pull of the sun, it took very little additional power to increase the velocity with which we were now shooting toward our distant goal.

All was going well. Everyone on board went about his appointed tasks in a casual way, as if such a journey were an everyday occurrence. The scientists continued with their observations. And throughout the entire ship there was a feeling of well-being and silent exultation.

Such is the human adjustment to the strangest of experiences.

And indeed, conditions on board the "Martian" were as comfortable as they could be, under the circumstances. The food was plentiful and good. And Jimmy Clark, our head cook, was a popular fellow to be sure, and the dining hall a no less popular place. Outside of the usual duties, there were the hours of recreation, of which all took advantage.

The men lounged, played cards, spun their yarns, or indulged in games. We had an assembly hall, with a movie screen, and an excellent selection of talking films. Some of the fellows were good musicians, and could sing well; and some passengers formed an orchestra that became a very popular source of recreation. There were also lounging rooms, a well-equipped gymnasium, and a good library. There were no severe restrictions, and everyone enjoyed himself when off duty as he saw fit.

It was Commander Lowell's plan to continue increasing our speed till we had attained a velocity of 28 miles per second. At that rate, counting the days taken for acceleration as well as retardation, his plans would bring us within landing distance of Mars in about twenty days. He was navigating the "Martian" so that its course was parallel with, yet somewhat out of the plane of the ecliptic, to minimize the ever possible danger of collision with any of the innumerable small moving bodies known to be coursing around the sun.

WE had been on the way now almost two weeks, through the silence of the cold, darkling space. So far everything had functioned as smoothly as a well running clock. We were about two-thirds of the way to Mars, the tiny ruddy disk of the planet now plainly visible. From the commander down, we were all in a jubilant frame of mind at the imminent success of our stupendous mission.

At the main controls in the navigating tower stood Commander Lowell, a viking of a figure, a serious yet pleasant expression on his face. He scarcely ate or slept, his keen mind and ever watchful eye overseeing and guilding everything with unremitting attention. What a tremendous feeling of confidence and comfort it gave one to see him.

"How is everything, Captain Bond?" he addressed me as I approached.

"Everything just lovely," I replied; "Running like a top."

"By the way: I see the thermal gauges indicate the temperature is down to 64."

'Yes, I know; I have already seen to that—Jackson says he soon will have her up a few degrees."

"Been to see the air-purifiers recently?"

"Just came from there; working fine; purity and humidity of inside air 99½ per cent normal.

"Good—that's as close as we can get."

"How fast are we going now, Commander?" I asked presently.

"Stepping along 28 miles per second. Guess I'll keep her there. We could increase the speed, but don't believe it advisable, as I do not wish to draw on our reserve stores of power. We'll make it in good time as it is. Mars will be in direct opposition in a few days, and we must chart our course carefully so as to drive into his field of gravity just before he passes, and circle for a landing."

We stood silent for a few moments, observing the celestial panorama before us. Suddenly, with a most sickening sensation, something struck the "Martian" a terrific blow. Simultaneously with the dreadful shock, came a deafening explosion and rending sound; our mighty ship quivered and trembled violently; and everyone on board was hurled about with great force. I was thrown clear across the control room and knocked unconscious, my head striking the opposite wall a fearful blow.

When I came to I struggled crazily to my swaying legs, my ears assailed by shouts and cries of pain. Outside of the control room, was frantic commotion, the running about of many feet. Dazedly I looked in the direction of Commander Lowell. He was on his knees, his eyes staring with pain, his face deadly white, a horrible gash oozing blood from his forehead. As if in a dream, I tried to make my way toward him, fear tearing at my heart, my head aching excruciatingly. I took a few steps, reeled and fell heavily.

How long I lay there, I do not kow, for I must have fainted dead away. When I opened my eyes again, the familiar hum and throb of the mighty engines were gone. I noticed the electric lights in the dark passageway leading below were out, the bright rays of the sun streaming through the sunward windows of the control room. Commander Lowell was standing over me, his head freshly bandaged, giving crisp orders to a dozen who had crowded about.

"He's all right," I heard Dr. McLeary, the ship's doctor, say. "Just badly stunned."

I was helped to a seat, and presently felt better; although my head was still aching abominably from the violent blow, which raised a bump the size of an egg.

By this time the commander was a tornado of action. Orders came thick and fast. The men were rushing

about in a hasty survey of the damage, giving succor here and there.

A cursory examination revealed that a giant meteoroid, no doubt weighing many tons, and perhaps moving as fast as we were, had struck the "Martian" almost amidships; and at the extreme velocities with which both bodies were traveling, had torn clear through and passed out on the other side, as if the armor-steel sides of the vessel were made of paper, leaving two great gaping holes. The propulsion machinery, as well as a portion of the gravity repulsion engines, were wrecked and melted by the force of the impact. Fortunate it was that our air-purifiers and cylinders of oxygen up forward were intact, as also our stores of power in the stern of the ship. The air-tight, multicellular structure of the "Martian" prevented the entire loss of air and heat through the huge gaping holes; as otherwise we should all have been suffocated or been immediately frozen from the exposure to the intense cold of outer space.

Two men in the engine room had been instantly killed, not a vestige of their bodies remaining. A number suffered broken bones and serious hurts. In addition, the explosive results of the impact had produced several cracks in the adjoining bulkheads, through which the hot gases of the melted substances together with the absolute zero temperature of space had rushed in, trapping a number of the men who barely escaped; although three of the poor fellows were horribly burned and frozen at the same time, so that their recovery was doubtful. And every one on board was badly shaken and bruised more or less.

A DETAILED survey of the entire ship soon revealed that our entire expedition—nay, our very lives were in a critical position. In passing clean through the ship, the force of the plunging body had not only destroyed the main unit of our steering mechanism, so that we lost control of the ship's direction, but the blow had put our gravity-repulsion generating engines out of commission, damaging them so badly that we could never make a landing alive.

Very serious, but not immediate, was the loss of a portion of our reserve water tanks, their valuable contents gone, and no doubt blown into space. Fortunately, the main supply was intact.

In addition, the force of the collision had turned the "Martian" from its course, so that we would never pass anywhere near Mars.

Detailed figures of observation and measurement showed that we were drifting helplessly through space at the frightful speed of 28 miles a second, in the direction of the outer planets. And unless something miraculously intervened, or we could repair the enormous damage in time (as seemed unlikely), our ship would move out into the infinite depths of space beyond the confines of the Solar System.

A horrible fate, frightful to contemplate, stared us in the face.

CHAPTER III

FOR long weary months, we had now drifted on. Day and night, as earthly reckoning went, all on board toiled and sweated and labored, with but brief snatches for food and sleep. We were all nearly dead with exhaustion and despair. As so often in the past many unfortunate mariners had drifted helplessly on the high seas, a prey to the buffeting elements, so we, too, were drifting in this infinitely mightier and vaster area of space.

Most of the men went about calm and brave, and worked with a sort of stoicism. But many were ready to give up the struggle; had even grown rebellious in mood. They were like those unfortunates who, exhausted and freezing, prefer to let themselves sink down and give up to the poisonously sweet numbness of death. But the indomitable will and determination of Commander Lowell kept all to their task.—The iron will of the man—his ever-flowing power! Even those of us who worked determinedly for our salvation, at times let our will and resolution droop and die down with despondency and hopelessness; only to be whipped into renewed activity by his inflexible determination. He knew just what had to be done to be saved; and went about calmly and collectedly, and even cheerfully; ordering, driving, helping, comforting. If I should live to be a thousand years old, never can I hope to see such calm heroism as shown every minute by that man. Without him I know we should all have gone to pieces, and perished out there in the void.

Fortunately, the repairs to our electrical system were minor, and we had plenty of light and warmth. The air was kept fresh and invigorating. But so badly damaged were the repulsion engines, the mechanism for driving and control, that often even I secretly despaired of ever being able to effect the needed repairs in time, under such difficulties and while in motion through space. For although our supplies were ample, and our men highly skilled, the intricate machinery and everything for coping with the disastrous injury had to be slowly and painfully manufactured under such adverse conditions, that we might all be dead before it could be completed. We lived on in the forlorn hope of a desperate fate.

"You will all work your fingers' ends off, or we all die," Commander Lowell told us time and again. "It can be done—and will be done!"

Long since we had longingly looked at the bright ruddy disk of Mars, as we passed helplessly by within a bare two million miles,—his brilliancy long ago dimmed to that of an ordinary star far behind us. And still our ship sped aimlessly on, with the necessary repairs far from complete. My heart was filled with dark misgivings: could we complete the work in time with the means at our disposal?

"Herbert," I questioned him one day, feeling particularly despondent, and looking into his eyes searchingly, "do you really feel there is hope?"

"Of course," he promptly answered; "of course there is. We started with a two years' supply of food and materials, and in spite of the tremendous difficulties, I know we can do it. But we have no time to spare."

Yet, shortly after, as if to confound the puny efforts of us mortals, and as if the spirit of space was jealous of man's impudent attempt to imitate the power of the gods, a new danger stared us in the face; this time definite and immediate. We were headed straight for a smash into the planet Jupiter!

WE were still far away from the giant planet. But calculations just completed by our astronomers revealed the startling fact that we had crossed definitely over into the vast gravitational field maintained by Jupiter. And our helpless space-ship was now being attracted and drawn toward it—and we, moving at such a frightful velocity! Only one more month! . . . Thus the end of all our hopes. . . . Destruction, sure and swift, now seemed certain.

"Boys," Commander Lowell spoke to me and Lieutenant Harkness, "our main efforts must now be directed towards the repulsion engines . . . our last hope."

For long, terrible weeks it was nip and tuck, with

the "Martian" shooting toward a straight-on crash. Jupiter now loomed large and diabolical, his huge bulk only a few millions of miles away. Feverishly we worked with our last shreds of strength, although all felt sure the issue was doubtful. In our hearts, and some even openly, we gave ourselves up for lost. Every man looked thin and haggard. A few were laid out with sickness and overwork; and one poor fellow, Monson the geologist, cracked, and his mind gave way under the strain. He developed a strange complex, and howled and howled and shrieked dismally, at times cursing us all horribly. I knew some of the men had resigned themselves to the inevitable, for I saw them praying silently off and on. Two of the mechanics laid down their tools, refusing to do another stitch of work, saying it was all useless, anyhow, and they might just as well apply their last hours to making peace with their Maker. We drove them back to work.

ONE million miles from Jupiter; the last rivet had been driven home—and a great shout went up from every soul on board.

"It's done, boys, it's done!" the Commander shouted jubilantly. "It won't be long now—before our good ship will be under control!"

A tumult of delirious joy rang out from voices that shouted in relief from overwrought nerves. Commander Lowell looked on, a happy smile on his face.

"All right, everybody," he finally commanded. "We still have lots of work before us. Many of our repairs are not of a permanent nature. We must land somewhere."

Came sharp, crisp orders, and every man sprang to his post. I stood at the Commander's side as the power was turned on, and we could hear once more the welcome hum and throb of the ship's mighty engines. How good and reassuring it felt!

Hours afterwards, our instruments indicated a greatly reduced velocity. The repulsion generators were exerting their braking effect; the propulsion cylinders working imperfectly, but nevertheless forcing the "Martian" to approach Jupiter at an angle.

"We must land somewhere as quickly as possible," Commander Lowell confided to me. "I don't like the sound of those engines. They are not functioning properly."

"Surely, Commander, you do not intend landing on Jupiter!—the conditions on that planet would no doubt mean sure death."

"Of course not!" he answered sharply. "What can you be thinking of! I am going to steer for one of Jupiter's moons and make a landing, until we have rebuilt everything as it should be."

"I guess my brain is not registering just right, after all the excitement," I laughed. "Which moon will you land on?"

"I shall call in the astrophysicists for a conference. Some of the moons are unquestionably unfit for landing."

A series of conferences was held between the astronomers, astrophysicists, Commander Lowell and myself to decide where to land. It was imperative to land soon, because, according to the Commander, who knew best, it was dangerous to travel too far with the "Martian" in its present condition, without landing somewhere to effect lasting repairs. As it was, the space-ship, although out of immediate danger, was not quite under perfect control.

The tiny moons of Jupiter were ruled out of the question. Callisto, although next to Ganymede, the largest, was also ruled out on account of its low density, being of the specific density of water. And a close approach to Ganymede (also of low density), immediately revealed that largest of satellites to be in a semi-gaseous and liquid state, and unfit.

The choice, therefore, narrowed itself down between Io and Europa as the only bodies on which a safe landing might possibly be made. Europa was at the time on the far side of Jupiter and nearing occultation. And Io, the larger and denser (its density is 2.7 of water) just then was approaching our side of the primary, and nearest; and further careful observations revealing signs of an atmosphere, we decided to attempt a landing on that satellite. Io, or moon I, as it is designated in astronomical circles, is 2450 miles in diameter, and revolves about its primary in the short period of 42 hours and 27½ minutes, at a distance of 261,000 miles.

With the decision made, the Commander gave the signal to prepare for a landing. The braking power of our engines had gradually reduced our speed to ten miles a second, to five, and then down to a mile, and steadily retarding.

We were now only a little more than 300,000 miles from Jupiter, and only about 50,000 miles from Io, which was approaching us fast; and the "Martian" steered straight for that satellite, with all hands standing by.

As we neared its surface, the engines braked hard. The final signal to land was given. We circled the surface of Io at a high rate of speed, but could not control the ship as formerly. Diving down at an oblique angle to within a few miles, we shot along, still going at about five miles a minute; barely cleared some extraordinarily high mountains, and continued on at a slower pace toward open country; the "Martian" the while settling rapidly and partially out of control.

Skimming the surface, we finally made a long, scraping landing, with considerable force, sufficiently hard to throw us all to the floor, but with no serious injury.

As we struck the surface, and above the grating and grinding of the "Martian," a loud commotion arose outside and cries rang out on all sides of us, the sounds carrying through the steel walls of our space-ship. On looking out, I was dumbfounded to see that we had landed right in the midst of some great city; and in our imperfect descent, had created great destruction, wrecking many of the buildings, and killing and maiming numbers of the inhabitants.

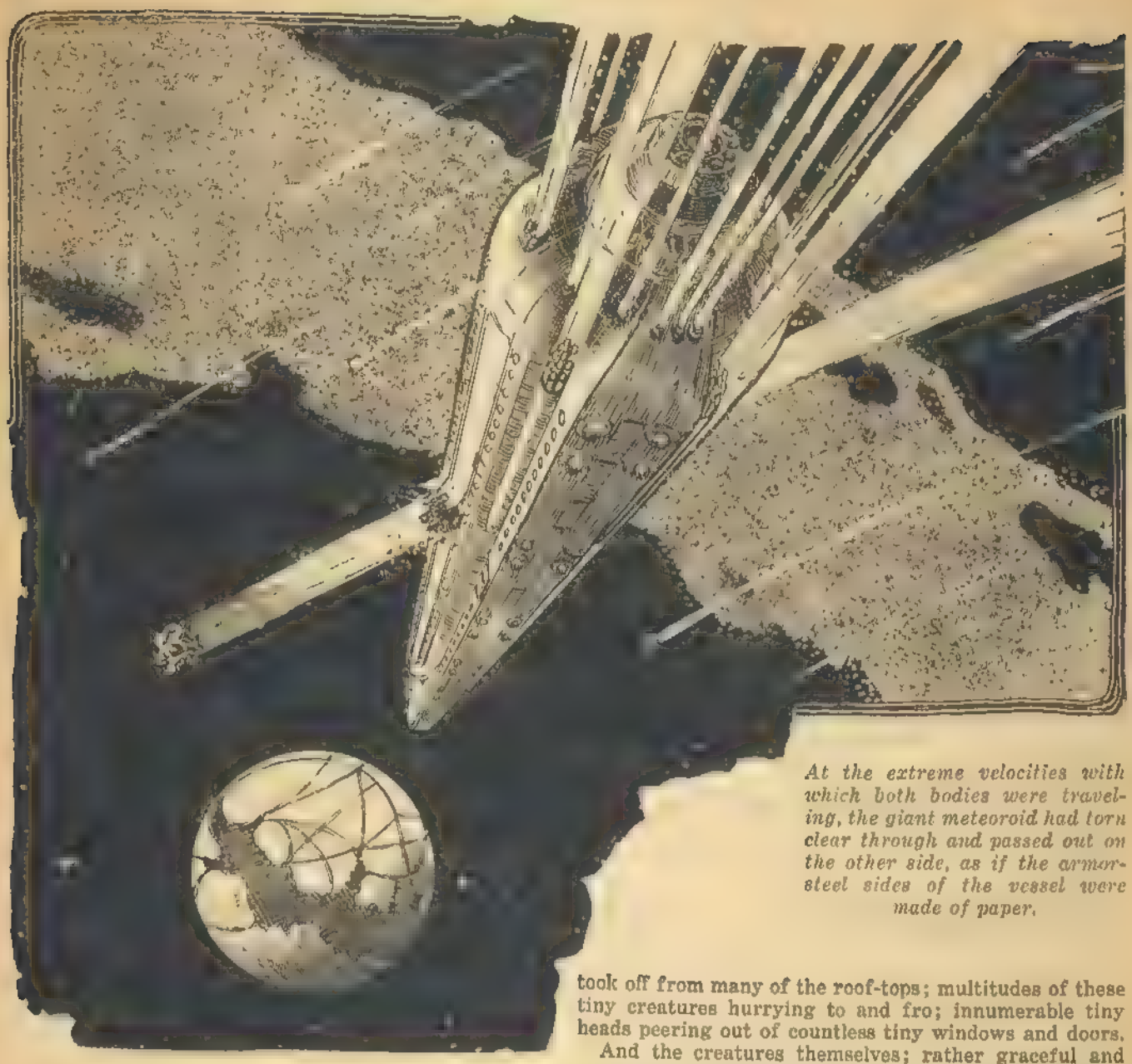
"Lowell," I cried, "look . . . Life! . . . Intelligent life! . . . We have landed on an inhabited world! . . . Heavens! —we have killed many of them in landing; how unfortunate."

CHAPTER IV

COMMANDER LOWELL stood silently at one of the portholes, I at another, surveying the amazing scene, suddenly and dramatically spread out before our astounded eyes. I looked through the open door and saw our men also standing before the glass protected portholes, as if transfixed, incredulous astonishment depicted on every face.

It was indeed a most unbelievable panorama which had burst upon our stunned senses; a scene such as even our most hallucinatory dreams could not have conjured up.

For unheralded and unexpecting we had burst upon a world inhabited by little people—but, oh, so little and so strange in appearance and build! They could not have been more than twelve or fifteen inches tall, bizarrely clad in cloth of shimmering gold and silver, and bejeweled; all running about crazily and in the greatest excitement, and vociferating loudly. A great many of them flew around and about us, up and down



At the extreme velocities with which both bodies were traveling, the giant meteoroid had torn clear through and passed out on the other side, as if the armor-steel sides of the vessel were made of paper.

in tiny flying machines of some sort, waving arms and gesticulating. Bedlam had broken loose among them. Our miraculously sudden appearance right in their midst, and with such destructive results, was as astounding to them as it was to us. And most disconcerting of all were the plainly heard sounds of agonized shrieking and cries of pain and terror from those unfortunate creatures, whom our sweeping, sliding descent had mowed down, or who had been caught in the crashing buildings.

The city in which we found ourselves, stretched out as far as the eye could see, but the buildings and streets were laid out on a very diminutive scale. And the structures were strangely beautiful, of a style unlike anything on earth. They varied in height, but mostly they appeared very small to beings of our size. They were built of iridescent and brightly hued materials; the tiny windows and doors and small entrances and streets giving the whole an unreal, doll-like appearance. Yet here and there some important building, rising to a great many stories, seemed quite imposing even in its actual height. Indeed, a number of these must have been all of a hundred feet in height. The tiny streets and the air above (if there was air, as seemed likely) swarmed with small vehicles and flying machines which took off from many of the roof-tops; multitudes of these tiny creatures hurrying to and fro; innumerable tiny heads peering out of countless tiny windows and doors.

And the creatures themselves; rather graceful and comely, but of such bizarre build! They stood upright on four legs, or rather, two pairs of legs. They had a pair of arms on either side of their slim body, one arm close underneath the other, the upper arm much the longer of the two. The two pairs of legs, straight and slim, gave these little people an appearance of sturdy stability. Their upright torso was comparatively small and human like and well proportioned, surmounted by a not unproportioned yet comparatively large head, which, however, was devoid of any hair whatsoever. Perhaps the oddest thing about their appearance—if in such bizarre beings it can be called odd—was the fact that they had four eyes, two in front—or was it front—yes, it seemed to be—and two in the back of their heads! High foreheads and shining dome, with two bright blue eyes without eyebrows, well-shaped mouth and chin, and the faintest suggestion of a nose. The eyes in the back of their head seemed a trifle smaller, of the same color, and set rather deep in a hollow depression in the upper part of the skull. "So they have eyes in the back of their heads," as one is sometimes wont to say in our world; the amusing thought struck me. I could see no signs of ears, but afterwards learned that they heard through what corresponds to our nose. They had no sense of smell. Their skin was a bright fresh pink.

For long we stood as if hypnotized, unable to tear our

eyes off the fascinating scene. Over all the sun was shining brightly, yet I distinctly noted that the sunlight was very subdued and not nearly as bright or strong as on our earth. That, I knew, was due to the fact that this new world in which we found ourselves was so much farther away from the sun. Overhead, the sky was a deep indigo, very dark, many stars visible even in the daylight. Through another porthole, I could see the huge, brightly colored globe of Jupiter, and even some of his moons.

I looked questioningly at Lowell. He read my thoughts.

"We must introduce ourselves to these beings, and explain our origin and the accident of our disastrous landing," he spoke, "but first we must test a sample of their atmosphere."

Samples of the outside air were soon obtained and carefully analyzed by our chemists, who, to our great joy, found it was thin and rarefied, but it was pure and breathable, with just sufficient oxygen content.

The commander gave orders to open the air-locks and unscrew the entrance. At the same time he ordered the machine-guns manned, and we all armed ourselves, to be prepared for any eventuality. For while the creatures were no doubt highly civilized, still we could not be sure of their intentions and real nature, especially in view of their probable resentment of the injurious manner of our landing.

As the entrance to the "Martian" swung open, and the landing platform was lowered, Commander Lowell, myself and a dozen others stepped out, and confusedly faced a vast assemblage of the Ioans, gathered by the hundreds of thousands, all standing and crowding around, keen little eyes taking us in.

Commander Lowell advanced a step or two, bowed low several times, and stretched out his arms in signs of humbleness and peaceful intentions. The rest of us on the platform, with bared heads, did likewise.

A great murmuring arose from the immense multitude, and for the time we could not be sure of its significance. We were prepared, however, to dash inside at the least signs of hostility. Out of the corners of my eyes, I could see the reassuring muzzles of our guns protruding from many of the portholes. Our men, I knew, were keenly watchful and alert. Little did we know at the time, that all this precaution at defense would have availed us little, had these little beings opened hostilities. Though small of stature and tiny of body, the Ioans possessed powerful weapons of destruction, and could have riddled us to death as we stood there on the platform.

SUDDENLY there came to our ears the sound of a bugle call, clear and musical; and immediately the great throng of Ioans in front of us parted and made a passage for a number of vehicles, not unlike toy automobiles, which rolled toward us at a fast clip. These moved on round spheres instead of wheels. (Later we learned that these spheres were hollow, and so mounted that their vehicles could move as easily sideways as forward and back.) In the front vehicle were evidently some important personages; the rest seemed to be in the nature of guards, for I noticed they carried something that looked like small firearms.

As the fleet of autos reached us, they came to a stop. One of the Ioans in the front vehicle stood up and addressed us in a strong, almost man-like voice, surprisingly full, considering the size of the creatures, at the same time he motioned with his upper arms; neither the language nor motions were intelligible to us.

Commander Lowell in turn pointed in the direction of the sun (for our earth even at night was scarcely visible), and the stars, and tried to make it plain we came from up there. They did not seem to understand; yet I could clearly see amazement in their features, while they looked us up and down, evidently stunned by our huge bulk, and no doubt, to them, strange appearance. For verily we must have appeared as monstrously gigantic creatures in their eyes.

"Better get an astronomical chart or something, Commander," suggested Professor Harry T. Saunders, the astronomer. "Maybe you can make them understand that way."

"Splendid; get one."

IT took a long time, but gradually a hazy form of intercommunication was established between our group and the Ioans. A large scale drawing of the Solar System with our tiny earth showing in its proper place finally did the trick. With a pencil, Commander Lowell traced our course from the time we left the earth; he drew a rough sketch of our ship, pictorially depicted the huge meteoroid striking our vessel; and then traced our craft to the Jovian system and the landing on Io.

They understood. Incredulity, unbelief was expressed in their faces. They walked around us, felt us, examined us carefully on all sides; all of us obligingly stooping down for their convenience. Here we were, unlike anything of their world; it was unbelievable. At last they were forced to believe their senses.

We sought to make them understand we were sorry for the havoc we had caused; they seemed to realize it had been through no fault of ours.

We were tired and cramped from our long half year of confinement in the "Martian" and by signs and motions we expressed our desire to be given a place to rest and fresh food. This also they understood, and the leaders motioned us to follow.

So, leaving a sufficient guard on the ship, and taking our weapons with us, we followed the important individuals with whom we had been in communication. I fancied, however, I noticed signs of displeasure at the sight of our weapons, whose import they no doubt understood.

Picture the strange sight, as our company, a hundred strong, threaded their way through the almost doll-like street, flanked by the miniature houses and buildings, surrounded by the immense throngs of little beings, who swarmed at our footsteps; our bodies towering above most of the roof-tops; our queer shape a source of wonderment to them; our huge eyes and mouths and hands no doubt terrifying to behold. On the other hand, this great disparity in size and the evident peaceableness of these folk made us feel rather secure and confident. And yet, had we stopped to think, strength and power does not come with huge size alone.

We walked along, carefully watching our step, so as to avoid any untoward accident due to our size. The city we were in must have been of immense size, housing millions of individuals. Everywhere was beauty and signs of culture and refinement, and—wealth And such wealth!

"Gad, many of these buildings seem to be decorated with solid gold and precious stones," one of the men remarked. And I heard many "ohs" and "ahs" and other expressions of wonder and astonishment from the men, as they marched slowly along, overwhelmed by the strangeness of it all, and at the sight of so much that on earth was scarce and precious. And in truth, signs of gold and other rare and valuable materials abounded on all sides, no doubt cheap and common in this world of the Ioans.

A fifteen-minute walk brought us to a group of buildings, quite large in their scale, of municipal or military

significance, or so I took it. Into these we were led, stooping low as we entered to avoid striking our heads. Inside was a sort of auditorium about thirty by fifty feet, and several more equally large rooms were connected by a large passageway with the other buildings. The ceilings arched over in flat domes, clearing the heads of the tallest of us by several feet. This was to be our temporary home. We were glad to accept it. In a short while quantities of bedding, made of some rubbery but sweet-smelling material was provided for us. Also food in abundance, strange but highly palatable, was brought.

We were all grateful and ate greedily. It was a welcome change from our usual rations. Much refreshed after our long, harrowing experience, but badly in need of rest and sleep, we signaled our guard on the "Martian" that all was well; and placing some men on watch as a precaution, the entire company stretched themselves out quite comfortably and fell into a sound and peaceful slumber.

CHAPTER V

WE slept a long time. Just before awakening, I dreamt I was sleeping late one morning in my own bed in my far away home, and was being called by the irate maid and reminded of an appointment with Lowell. Rushing to meet him in my sports monoplane, my left wing bent right under me, and I fell careening into a huge crowd down-town. It woke me up with a start. I sat up, unable for a moment to recall where I was. Some of my sleeping companions were already up and dressing. In a flash everything came back to me; yet it seemed unreal to be here so far, far away in this strange world.

And then commenced a strange new life that at times, try as I would, seemed to have all the eeriness of a fantastic dream. From then on there was not one dull moment. So much to see, so much to discover, so many strange things for the mind to grasp and absorb.

We were made to feel quite welcome by our little hosts, who went to no end of trouble in ministering to our comforts. They saw to it that we wanted for nothing.

One of the first things the Ioans did was to begin with our instruction in their language. This we all found quite difficult, on account of the peculiar construction and syntax. The spoken words especially were hard to imitate, due to a greatly different structure in their vocal organs. However, by dint of perseverance, some of us, at any rate, managed to do quite well enough, so that intelligent communication could be carried on with our little hosts.

And many were the fascinating things I learned. Study and close observation revealed many queer, astounding and even amusing things. We were permitted to go to and fro, and mingled freely with the inhabitants, who seemed not at all afraid of our huge bulk. Commander Lowell gave strict orders, under pain of severe punishment, to avoid any infringement of the hospitality shown us everywhere. He cautioned everyone to be most careful of the life and limbs and property of the little people.

IN time I came to know the Great Chiefs, as their name implies, quite well. There were four of these Great Chiefs, or heads of Urgand, the name of their particular nation or country on Io. The form of government was highly democratic, the Chiefs being elective, and comprising the co-equal executive arms of a much larger governing body, similar to our Congress.

Two of the Great Chiefs, in company with a numerous retinue, called on us shortly after our arrival and made it plain to us that possession of our arms was very distasteful to them. A close examination of these weapons by a group I took to be engineers clearly convinced them of their probable destructiveness. They made it as plain as could be, that if we wished to stay in peace, we must surrender our weapons into their safe keeping, or depart to the place whence we came. (Later, we learned that they were of a war-like race, and mistrusted any kind of arms; and as they could not be sure of our intentions, they took this precaution of safeguarding themselves.).

Commander Lowell, as well as the rest of us, were loath to surrender our weapons. However, we were greatly impressed with the sincerity and graciousness of the little Ioans. And after a lengthy conference, in which we all took part, and being assured by the little beings that we had nothing to fear—that they would do everything within their power for our comfort, and assist us in every way—we finally decided to accede to their wishes. Whereupon Commander Lowell ordered every weapon to be surrendered, and urged everyone not to betray the confidence of our hosts and our honor by withholding anything. So we turned over to them, till our departure, all revolvers, rifles, machine-guns, as well as the two cannon which we had on board.

The Ioans expressed great satisfaction at this token of our peaceful intentions; and graciously permitted Commander Lowell, Lieutenant Harkness and myself to retain our weapons. For this gesture of confidence we thanked them.

We were also requested to remove our space-ship, whose huge bulk was a grievous obstruction in the city. They offered us a large open field on the outskirts of Delimas, the city. We effected the removal as soon as we could, which was about thirty days later—the tremendous jar of our landing had undone some of our temporary repairs—until some further repairing Commander Lowell would not risk lifting the "Martian." Afterwards we resumed our living quarters on board, going to and fro about Delimas and its environs, in constant touch with the little people, who seemed to appreciate to the full the fact that we were other-world visitors. They supplied us generously with everything possible, and brought us food in abundance; some of the men literally gorging themselves with the delightfully tasting fruits, vegetables and other delicacies which the populace was constantly offering us, all clean and fresh and brought in their little lorries or other vehicles, and served in artistic baskets and trays of delicate designs.

We were also permitted to make use of our autos, some of the main roads being quite wide enough for the purpose. And in these we made considerable excursions, going at a moderate speed, and careful not to run down the moving traffic. In fact, at first the Ioan authorities gave orders for these roads to be cleared of traffic in advance; and the Great Chiefs of the nation even honored us by accompanying us on some of the trips. Occasionally Lowell and I took some exploratory flights in my monoplane, although unable to rise to any great extent on account of the thin atmosphere.

I STRUCK up an intimate friendship with our chief instructor. His name—I will use "he" for lack of a more accurate pronoun—was Ospana. He was unusually tall for his kind, standing fully fifteen and a half inches without his sandals. He was in the prime of life and the parent of five children.

His knowledge and learning were really of a high order; and in addition to his other scientific attainments, which I assure my reader were quite comparable

to those of a highly educated person here on our own planet, he was an astronomer of note in his world. Into that little brain of his was crowded a store of facts that amazed me; and I soon learned to view with respect the quality of the Ioan brain, in no whit inferior to the human.

Nor were their sciences, and particularly the science of astronomy, of a low order. Light, which to them was very precious, on account of their distance from the sun, had received a great deal of attention, perhaps more so even than with us on earth; and they have evolved telescopes and reflectors of a kind and size which gave them a knowledge of the stellar universe in many respects hardly inferior to ours.

And so Ospana was naturally curious about our far-away world, its development, its history, and everything pertaining to it. I learned afterwards that he gave frequent lectures to vast audiences on the facts he learned from me about the earth and its teeming life. And as I can modestly say that my learning had been by no means neglected, being of an insatiable turn of mind with regards to knowledge of all kinds, I was able to impart to Ospana a not inconsiderable amount of fact and description regarding our world.

In my discourses with Ospana, I would often sit on my haunches, or recline on the ground, while he would perch himself on a table or something, so as to bring our faces as near as possible. Our interest was quite mutual. In fact, we grew to be extremely fond of one another, spending a great deal of time in each other's company. Ospana and I must have presented an odd appearance when together, with the great contrast in our size and build. Indeed, our companionship became the butt of some good-natured jokes for some of our men. When walking with me his four feet in their bejeweled sandals would move briskly to keep up with my leisurely gait. On several occasions I essayed to carry him on my arm; but this his great dignity would not allow, for the Ioans are an extremely proud and sensitive race.

And it is not too much to say that in the end he was instrumental in saving not only my life, but the lives of our entire expedition from a horrible death.

From Ospana I learned a great deal of the life and characteristics of these intelligent beings and their history; and the life and conditions on Io, their world. They were the dominant and highest development of life on that globe. In their scale of life, they designated themselves as *Ionars*, the name *Ionar* implying the same relative meaning as man or human does to us. By actual measurement, I found their average height was between thirteen and fourteen inches, with a small variation one way or the other. Their weight was in proportion; and they were nimble and graceful in their movements. Their voices, as some of the men facetiously remarked, were the biggest thing about them. Its astonishing volume was due to the peculiar development of the laryngeal structure. One wondered at first where this full, man-like voice came from; their little bodies seemed so inadequate.

The city of Delimas, the capital, and their country Urgand, in which we were, was situated in a deep valley, almost a hollow of Io. All life in that world is in these deep valleys; fully half of their globe being mountainous, volcanic, deficient in atmosphere, and quite uninhabitable. These high regions are extremely tall and majestic; many of the peaks rising to heights of 45,000 feet above the valley floors, mournfully bare and devoid of any signs of life. The various countries and peoples of their world, of whom there are quite a number, in fact, the entire life of the satellite exists only in these great low levels or valleys.

The atmosphere does not rise high above the extensive valley levels, and is mainly confined there. The climate is delightfully pleasant, cool yet warm, varying very little—except, of course, in the higher regions, which are always unbearably cold. This at first surprised me greatly, for I had expected tremendously low temperatures so far from the sun. But it seems, if I may place reliance on the cosmogony of my little friend Ospana, that Io is a comparatively recent offshoot of Jupiter, astronomically speaking, with a very hot interior and a somewhat thin outer crust, thus keeping the surface of the satellite warm with its internal heat, and giving a perennially warm climate.

THE great, primal, all-important factor in their lives was water—or rather, the scarcity of it. When I told Ospana that on our earth water was the least valuable of elements on account of its vast plenteousness, he could scarcely believe it. And when I told him of the size of our oceans, their great depth and extent, he grew incredulous. But I assured him of the fact.

"Three-quarters of your globe covered with water!" he exclaimed. "How impossible that sounds. And is it all fit for use?"

"Yes, more or less directly. The sun and wind and rain transfer plenty from the oceans to the land"; and I explained the sources of our mighty rivers and fresh water lakes, and the innumerable springs and falls and flows of this all priceless though common fluid.

For in their world there were no oceans nor even any large lakes or rivers. Their water sources were mainly subterranean, consisting of few and far between gushing springs and tiny rivulets, and small lakes and artificial reservoirs; and there was very little rain. Water was meted out to the population of their world carefully and expensively, and transferred and piped from center to center, almost in the same way as we haul and pipe oil supplies on earth.

And right here I learned that this scarcity and control of water, back as far as their earliest records went, was the cause of much strife, tremendous and ruthless. The greatest struggles in their histories centered about water, between individuals, cities and nations and groups of nations. And their poets sing of flowing water in the same spirit as our poets sing of land "flowing with milk and honey."

These struggles for the control of the water sources were desperate and sanguinary in the extreme. For whoever controlled these controlled not only the price, but the food supplies which depended mainly on artificial irrigation—and life itself. And when, due to a temporary insufficiency of this life-giving fluid in one part of the world or other, the prices went up incontinently, there arose much bitterness; which often led to a declaration of war and forcible attempt at seizure or abatement.

In all that, they were not unlike us humans on earth, who also have fought for and dispossessed other nations and peoples for the things we wanted. And it was not unlike the economic pressure and world trade which are the cause of modern wars on earth.

"And you 'Earth-monsters' never fight for water?"

"Well, no—not directly, or very rarely in certain places," I told Ospana. "We fight for freedom, for land, for power, for world trade."

CHAPTER VI

I WAS witness to a very distressing sight, which made me sick with pain and disgust. Lowell and all the rest were busy a great deal of the time going over the ship's injuries; and with the facilities and aid

of the Urgandians, of whose materials and mechanical equipment we availed ourselves, the "Martian" was gradually being put into first class condition. But due to a request by the Chiefs, Commander Lowell excused me from pressing work, so that Ospana and I could continue with our discourses and mutual information.

Ospana had invited me to go and see the "Occultation Sacrifices."

"What sacrifices?" I asked.

"We make a sacrifice of nine *lonars* (Ioans) to our god, at every occultation by Jupiter," he explained. "In the capital of every nation they do likewise."

I was frozen with horror, and for a minute could not speak.

"Good God," I ejaculated, "do people of your high civilization practice sacrifice of your kind? For what reason?"

"It's in our religion," he answered, noting my astonishment and look of horror. "Do not you Earth-monsters do it on Earth?"

"Why no!" I exclaimed—"at least, not for many centuries," I corrected myself. "Human sacrifice is a practice happily long since gone out of our world."

"Well, to tell the truth," (and he moved closer to me and lowered his voice), "I really do not believe in it myself, and there is a growing minority who feel the way I do about it; but as you yourself have related to me of your conditions on your planet, certain beliefs, and superstitions are not easily gotten over with. It's sacrilege to say anything against it, and might cause me to be selected as one of the sacrifices"—and he looked nervously around him to make sure no one had overheard us.

"And why do you sacrifice nine people?"

"One for every one of Jupiter's moons," he explained. The first of every Ioan month, which is only 1 day, 18 hours and 35.5 seconds as you Earth-monsters reckon time, and just as we are occulted by Jupiter, a burned sacrifice is offered up, to insure our world's coming back into light again—at least, so the custom originated. These sacrifices continue at stated intervals until the ninth, just before we emerge again into the light of the sun from behind Jupiter's shadow."

FASCINATED, yet horrified, I accompanied Ospana to witness the Occultation Sacrifices. These took place in a large amphitheater, magnificently proportioned and immensely large, as sizes go in their world. The richness of its appointment made me gasp—the bejeweled seats, the gold paved aisles, the rare crystal inlaid columns of precious metals, the scintillating manifold entrances . . . and the magnificent approaches! I doubt if all the gold circulation of our world, plus all the jewelers' treasures would equal what lay spread before my astounded gaze! In a world where precious metals and rare stones were easily obtained, they lavished the finest on these amphitheaters, with all the arts of the rarest craftsmanship.

A great multitude was gathered. In the center of the great amphitheatre, on a raised platform built of rare metals, were gathered a number of high dignitaries, religious and civic, together with the priestly executioners. All about this platform, where the richness was lavished the most, were costly ornaments, vases and other articles, whose meaning I did not know. The nine victims sat huddled in a corner, a small vase of water in each upper hand, bedecked with costly raiment, flowers and jewels strewn all around them. In the very center of the platform, on a sort-of altar, was a gold platinum urn of large dimensions, glowing red hot—the "Sacrificial Urn." Near it, and rising by steps to the level of the urn, which was about ten feet high, was a small dais on which the victim stood while some official uttered some words of religious significance before the final act of sacrifice.

I stood shivering, tempted to flee from the sight of this monstrous tragedy which superstitious ignorance garbed in the cloak of an ancient religious belief was about to perpetrate. But fascination—the fascination of horror—held me; besides, it would have been held as an impious act had I left just then.

As the huge bulk of Jupiter, which filled a goodly arc of the sky, drew near the sun's edge, the immense multitude stood silent and waiting, hands upraised. As the last glimmer of sunlight was blotted out behind the dark body of Jupiter, a great shout went up, their strong voices deafening; the impression awe-inspiring. A stygian darkness enveloped the weird scene, with the light from the glowing "Sacrificial Urn" the only thing visible. Then the amphitheater was lit up with myriads of multicolored lights, casting a bizarre light on the scene. Dimly I could see the first victim led up the steps to the raised dais . . . an expert sword thrust . . . thrown headlong into the flaming urn. Then followed one sacrifice after another until the nine were consumed. At the first sign of the emerging disk of the sun, another great shout went up; and the gathering dispersed. Their god was satisfied.

This dreadful practice, in spite of their truly great civilization, was the survival of an ancient rite, springing from their need of light and the frequent and long occultation periods, and a mistaken conception of the deity. Yet signs of the practice dying out were not wanting; two small nations on the other side of the satellite (so I was told) having discontinued the practice in recent years.

I learned later that the *lonar* population is multiplying fast on Io, and taxed the resources of their planet. Their average life-span was only equal to about eighteen or twenty of our years; and generations came and went in swift succession.

WE humans were a source of never-ending interest and even amusement to the Ioans. Our natural build, our appearance and habits were in so many ways radically different from theirs. For instance, they could never quite understand how the "Earth-monsters" achieved a stable poise with bipedal means of locomotion.

"How do you balance yourself, with only two legs, to keep from falling?" one of our instructors had inquired.

They had at first assumed, taking it for granted, that we were incapable of a running motion, for they had seen us only in a walking gait. Imagine their astonishment when they first beheld some of us running with great leaping strides, which we could do all the more easily as the gravity on the surface of their globe was much less than ours; and we could run at a terrifying gait.

Nor could they understand the nature and purpose of our hirsute adornment, some of our men being particularly hairy; something nature never developed on their planet. And they marvelled at our prodigious appetites and the vast quantities of water which we consumed, as they were dainty eaters and drinkers, even for their small size. The fact that we were neglected by a niggardly nature, with only a meager single pair of arms and hands, caused them to marvel nevertheless at our dexterity and manual cleverness, although constrained to commiserate with us on our "natural handicap," as they put it, in not having two pairs of such useful appendages as they were blessed with.

They could not believe, at first, that we had only one pair of eyes. Some of their scientists had examined the

backs of our heads carefully, drawing our hair apart to see if it were true. We assured them that we could see quite well with only two eyes; and they smiled and shook their heads, as if in doubt.

"How inconvenient," Rovanaha, another of our instructors, had remarked. "Do you always have to strain your necks, and even turn yourselves clear around to see on all sides?"

When we assured him we did not need eyes in the back of our heads to see quite well everything that went on about us—in fact, we didn't even miss them—they would shake their heads, and say: "How inconvenient."

Another source of wonder to them was our comparatively long life, and how we could live so long. They marvelled at the terrible strength of our muscles, which on account of the lessened gravitation, and being created for conditions peculiar to our earth, was, even for our size, beyond their comprehension. As to the sense of smell, in so far as that was a sense never developed in them, they could never understand it, and were greatly puzzled to decide if we really had such a sense at all.

ONE day I went to visit Ospana at his home, a rather pretentious affair. By stooping double, I managed to squeeze through an extra wide portal into their main living room, which I half filled. I could not stand up, but sat on the floor. I peered into some of the diminutive rooms, all sumptuously furnished, works of art on a tiny scale in evidence.

My host and his mate and their five children crowded around me; and the little ones frollicked all over me, and even played hide-and-seek in my clothes, to the great amusement of the elders as well as my own.

For a long time Ospana and his kind could not understand why no young were born to us. In fact, he confided to me, that he and his scientific colleagues had been eagerly awaiting such an event, to see what our young looked like at first hand.

I smiled and told him we had no women on board, that our expedition consisted solely of men. At which he was greatly puzzled. And I had to explain that the nature of us humans was bisexually organized. I told him that all of us here were men.

He understood, yet wagged his head in amazement. He even ventured to express himself and said: "No doubt the division and specialization of your sexual organization has its advantages; but I believe ours seems much superior, as we are not so limited in our choice of a mate to only half of the individuals of the race, as you are."

Thus, my dear reader, you may see how strange and different we may all look in another's eyes.

CHAPTER VII

THE country of our temporary adoption, in which we were all given, with great pomp and ceremony, full citizen rights, in honor of our other-world origin—Commander Lowell as the leader receiving extra special rights that were quite valuable—was one of the largest, most powerful, and perhaps the richest nation on Io. In point of civilization, in the arts and sciences, in the degree of culture and industrial development, Urgand was in the van of progress in their world. Not only was their actual as well as potential wealth and resources of an order by no means to be despised—even as judged by the standards of the richest nations on earth, but they controlled a large proportion of the life-giving water sources; and hence exerted a ruling power in their world. And in addition, their country was unusually blessed with mines of gold, platinum and other rare metals, as well as precious stones and minerals in great abundance. In fact as I have mentioned, their whole globe shared in this abundance, so comparatively rare on the surface of our planet.

But it was their control of copious water resources which made their country the object of much envy and jealousy on the part of many of the other nations who were much less fortunately placed. And to protect themselves from invaders, the Urgandians maintained a large standing army and air fleet.

A NEIGHBORING nation, called Calinta, was just then experiencing its periodic shortage of water yield, and there was in consequence much suffering. The deficiency began to be felt over a large part of a hemisphere. To transport such unusual quantities from the far parts of Io was not only a costly but forbidding task. The Urgandians took advantage of Calinta's distress, and profited greatly by raising the price of their water. This naturally aroused much bitterness in the sister country.

With the water shortage becoming ever more acute, and the Urgandians, who were the main source of supply, constantly increasing the rate, in the same way as supply and demand control prices on earth, the Calintans grew desperate, and the hot flames of passion swept high. In their dire need they threatened an invasion and a resort to arms. Necessity knowing no natural rights, they resented bitterly the more favorable situation of the Urgandians, and their excessive profiteering in this all-necessary, life-giving element. On their part the Urgandians, following the logic often felt by nations in past history on our earth, resented hotly the attitude of their neighbors. What right had they to attempt to dictate the price and quantity of what inalienably belonged to them? In an all too human way each thought so much of his own rights that he failed to see the rights of the others. It was only the superior might of Urgand, however, which kept Calinta from immediately plunging into an open conflict.

But the stringent water scarcity spreading to several other nations, they also raised their voices in loud protest. This did not prevent the Urgandians from insisting on their right to levy what they chose, and force the less favored nations to "pay through the nose," as we are wont to say. "Pay or do without," was the ultimatum—a very dissatisfying choice, when it came to such an absolutely necessary element as water.

The situation kept growing ever more tense, with all the parties forgetful of the consequences of such cause of strife, which had so often in their past histories convulsed their world. A coalition between Calinta, Ponduro and several other nations finally developed. The allies declared war on Urgand, and struck with great suddenness.

Urgand, however, was not unprepared; the huge fighting forces always in training were ready for just such an eventuality: and the coalition being also very powerful, as well as determined to seize some of Urgand's water resources and wreak vengeance, the struggle took on huge proportions, with millions of combatants engaged on both sides.

FOR a while the men of our expedition were quite unaware of the magnitude of the struggle going on. They were busy rebuilding the "Martian" in its original staunch condition, and betimes amusing themselves with the many interesting things to be seen.

Soon, however, the heat and excitement of the war going on between these little people forced itself on

our attention. The usual order of their daily lives seemed to have undergone a great change. Their little mills and plants belched smoke and fire by day, and reddened the skies by night. Their roads and highways were crowded with vehicles; the air hummed with fleets of their tiny flying machines. All was excitement and bustle. And through the streets of all their cities marched countless thousands in battle array.

To us men of earth the seemingly small scale on which this drama was being waged—the small size of these folk, their toy-like cannon and other implements of war—appeared almost ludicrously inadequate. Yet their seriousness and evident determination as they went about the business of war reminded us of war on earth. "A regular tempest in a teapot," someone declared jocosely.

"I fancy seventy-five or a hundred of us men with our machine-guns and field-pieces could take their little armies and knock 'em by the head, eh, what!" big John Gregory remarked.

"Well, it would be a shame to ride rough-shod over these little fellows," Jimmy, our cook, answered. "Better pick on somebody your size, Gregory," he chided.

"Perhaps we ought to do something to help our little friends," someone added.

"It's not our fight," answered another. "We didn't come here for that, so long as we are left out of it. Let 'em fight it out till they get tired of it; that's my say; it's none of our business."

"Just the same," came the deep voice of Spencer Hawkins, the chief electrician, "these little chaps have befriended us and given us valuable assistance. I hardly know what we should have done without them; and I'd hate to see them get licked, if we could help in any way."

And so the conversation went on, back and forth.

However, as the battle lines were far away, we really had no idea of its scope and deadliness, and for the time being dismissed it from our minds. But the great hum and excitement which carried on all about us eventually forced us to take notice. And as our knowledge of their language kept on improving, it finally dawned upon all of us that a real war was going on in this far-away world. It became a sort of a game with us to keep posted on the progress of the struggling lines. You see, we really did not take it seriously at the time.

OSPANA came to me one day and told me the situation looked critical for his country. The Urgandian armies had suffered several serious reverses and were in retreat. Also, the enemy coalition had obtained a partial mastery of the air, and things looked rather bad.

That evening we all fell to discussing the situation. And the upshot of the whole matter was that nearly the entire expedition, including Commander Lowell himself, felt that, in so far as the Urgandians were our friends, and had honored us with full citizenship, we were honor-bound to do what we could to help them stem the tide of battle which was going against them. An almost unanimous vote being taken in the affirmative, Commander Lowell and myself called on the Great Chiefs, and offered the fighting services of our entire expedition in their behalf, over a hundred strong, many of us having had military training at one time or another in our past. If they should consent to give us our arms, we would place ourselves on their side.

The Great Chiefs thanked us profusely, and said they would inform us of their decision on the morrow. The prospect of some excitement got into our blood, and eagerly we awaited the result of our offer; the more so as few of us felt that there could be much danger in it to us, on account of our superior size and equipment.

CHAPTER VIII

WE were on the way to the battle front. A small guard was left behind on the "Martian." For two weeks we trained intensively, making feverish preparations. Commander Lowell had delegated the military command of our unit to Colonel Ferguson, sportsman and soldier, of whose war experience and knowledge of military tactics he availed himself.

Our destination was about 200 miles distant, and we marched steadily forward, hiking or taking turns in relays by riding in our four autos, eager to reach the battle front. In addition to carrying our own weapons and supplies and hauling out two field-guns, a huge fleet of the Urgandian motor lorries, which followed in our wake, transported ammunition, food, and other impedimenta of war for us. It was almost a lark, and we were all in great spirits. The fact of our intended intervention was kept a secret from the enemy, the Urgandians hoping that our huge size and huge weapons, and the surprise of our appearance in the battle line might have an effect in their favor. Our field-guns especially were incomparably larger and more powerful in range and destructiveness; although those in command (as we learned later) failed to see how our small number could have any ultimate effect one way or another when so many millions were engaged. On the other hand we marched along quite confident of our prowess.

AS we neared the battle lines, I could hear the rumble of firing going on and saw smoke covering the horizon. The firing, although in great volume, seemed to me thin and rather weak, overlaid with a heavier sound like rifle-firing, and with the deeper undertone as of small cannon. Our men had a feeling of power and hugeness as they marched along the tiny highways, their heads towering among the dwarf trees and country homes, and amidst the swarming Urgandians. Except for some very distant mountains, everything seemed on such a small scale; the landscape, the life, even the vegetation.

Overhead, Larry Smith and I were circling about in our airplanes, reconnoitering the general terrain ahead of us, each with a trained machine-gunner at his post.

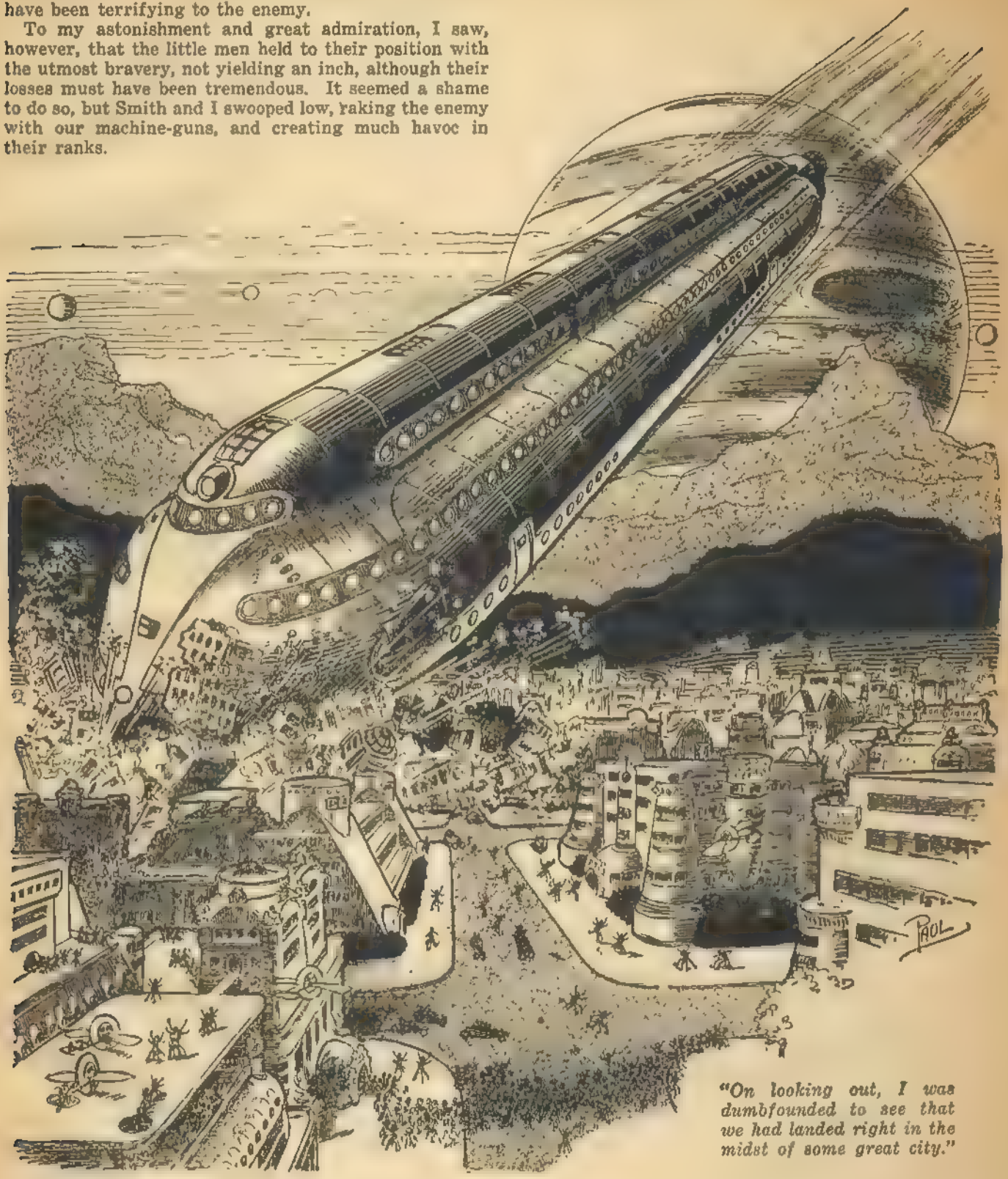
Arriving close behind the battle front, Colonel Ferguson barked the order for deployment. Our battery of two field-guns was hauled into position and prepared for action. Both were of the quick-firing type; one an eighteen pounder capable of twenty-five shells a minute, the other a much heavier, powerful cannon, hurling a sixty-pound shell. We kept in liason with our Urgandian friends and allies, who advised us of their plans and the movements of the enemy in front of us.

When all was in readiness, Colonel Ferguson ordered Larry Smith and myself aloft over the enemy lines, to observe and to get the range. With our engines roaring defiance, we rose into the air, although we could not rise high in the rarefied atmosphere, even with our superchargers. We soon signalled the range, and our guns opened up.

The result of our fire was deadly in the extreme, the powerful detonations and explosions of our shells as they struck home reverberating loudly above the entire din of battle. Through the aid of my glasses, and even as I swooped low over the enemy lines, I could see the dreadful destruction caused by our bursting shells. At the same time our men advanced, the two caterpillar armored cars leading, our men sending over a steady rifle fire; the loud rat-tat-tat-tat of our machine-guns used at short range, pouring their deadly hail in the direction of the enemy. Our sudden attack and the explosions of our shells, so much more powerful than any-

thing employed by either of the contending forces, must have been terrifying to the enemy.

To my astonishment and great admiration, I saw, however, that the little men held to their position with the utmost bravery, not yielding an inch, although their losses must have been tremendous. It seemed a shame to do so, but Smith and I swooped low, raking the enemy with our machine-guns, and creating much havoc in their ranks.



"On looking out, I was dumbfounded to see that we had landed right in the midst of some great city."

In no time, and to our great surprise, we were assailed from all sides by swarms of their tiny air-craft, a perfect hail of missiles striking armored planes. Undismayed by the intervention of the "Earth-monsters," the Calintans, as soon as they became aware of the presence of our force, had concentrated their largest artillery to combat us. And now we were enveloped in a steady fire, some of their shells exploding with amazing force.

Suddenly I saw Larry Smith's plane surrounded by a veritable halo of exploding shells; and to my dismay and horror his machine careened and began falling in a tail spin, crashing to the ground a flaming wreck.

My own position, too, became critical. In spite of the armored wings and body, my machine was pierced by high-powered little bullets; and the sudden near explosion of some high-powered shell, which must have been of considerable dimensions, caused my plane to tip violently to one side, almost getting out of my control. The attack of my assailants increased in fury and

force. My machine-gunner, who was all the time pouring a hail of lead into our enemies, gave a lurch and shrieked agonizingly, the entire side of his face shot away.

I suddenly realized that I need not have been so sorry for our little enemies; that evidently they could give a very good account of themselves. And seeing that at any moment I was in danger of following Smith in a flaming, crashing death, I turned tail and fled, pursued by hundreds of their flying machines, the Calintan gunnery from the ground following me close. At any second I expected to go down. I was as near death as ever I care to be. I was covered with blood, struck by several high velocity missiles which wounded me in a number of places, one of them piercing my left hand, and another inflicting a painful wound the whole length of my scalp. Putting on a burst of speed, I distanced my pursuers, and landed behind our own lines, exhausted and weak from loss of blood. And lucky for me I landed when I did, for I discovered my gas tanks were pierced and leaking, and it was a miracle I had escaped a flaming death in mid-air.

I hastened to report to Colonel Ferguson, and laid down to rest, after being given first aid. The loss of Smith and his gunner was a grievous one, as they were great favorites with the men.

Nor was all going well with our men. I was grief-stricken to learn that several had already been killed in the action, and a number severely wounded. The Calintans and their allies had concentrated their heaviest fire in our direction, and were intent in making it extremely hot for us—and were succeeding, too. They also employed a destructive sort of gas, greenish in color, which they sent over in large volume, then ignited it with terrifying effect by firing incendiary projectiles from a distance. Another gas their science employed produced a state of temporary unconsciousness after it was inhaled for some minutes and which was sometimes used to capture large numbers of the enemy alive. However, our big field-guns stationed far to the rear, completely out of range of the enemy, were continuing their deadly destruction.

CHAPTER IX

FOR over four days now, the opposing armies had been locked in a desperate struggle, on a hundred and fifty mile front. The Urgandians were beginning to waver, and then began to retreat on a wide front.

The Urgandian command advised us to fall back, to prevent an enveloping movement. But Colonel Ferguson, in consultation with Commander Lowell, decided to hold his ground. We were in a strongly entrenched position, our machine-guns hidden and well placed, our artillery out of the enemy range, yet continuing their destructive thunder.

The Calintans were coming ever closer, determined and deadly. They were advancing on our position, unmindful of the dreadful havoc of our fire.

"We'll give 'em hell, when they come closer," Colonel Ferguson remarked.

On they came, in a steady drive on our position, fearless and brave. The little fighters filled us with admiration, worthy of our mettle and steel. As they came close, our machine gunners caught them in a murderous fire, mowing them down by the hundreds, while we kept up a withering fire with our quick-firing repeating rifles, the shells of our big guns tearing great gaping holes in their ranks.

"Just see the little devils!" Lowell remarked to me. "They keep coming on as if they have no fear. There are too many of them, and soon they will be upon us."

Closer and closer they came. Our men were falling around us, many wounded more or less, a swarm of the enemy fliers fighting right over us, in mortal combat with the Urgandian fliers who sought to protect us.

Our situation was fast becoming critical. The wide retreat of the Urgandians had left us entirely exposed, and soon we would be completely surrounded.

"Don't you think, Colonel, we better retreat, too, while we can," I overheard Lowell say, above the noise and din.

The order to retreat was given, and it became a fight to extricate ourselves from our perilous position. We had waited just too long. The Urgandians had to come to our relief with a covering barrage of their concentrated artillery and gas flames. And I firmly believe, that had it not been for the assistance of our Urgandian fliers, who sought to protect our retreat, we would have been mowed down from the air by the enemy fliers.

As it was, their high velocity shells, small but powerful, piercing our armored cars, had completely disabled three of our four cars; and our men had to abandon them in order to escape. In addition, the crew of one of our guns was nearly wiped out, and in our hasty retreat, were forced to leave our heavy sixty-pounder behind, and it fell into the enemies' hands, while we barely succeeded in saving the other field-piece.

It turned into a long, grueling retreat, our sole remaining machine filled with those of our men who were too badly wounded to walk. We were forced also to abandon our dead. In fact, for a time, our entire expeditionary force was in deadly danger of actual capture, barely escaping from clouds of the gas, producing unconsciousness as well as the deadly burning kind let loose by the near approaching enemy. It became almost a rout.

I, FOR one, began bitterly to regret having taken part, though well meant, in a struggle which, after all, was not our concern. We should have remained neutral. I began to realize that we had not taken the might and prowess of these little beings seriously enough, and had woefully underestimated them. At any rate, we were too few in number, and should have kept out of it. Our expeditionary force had blithely embarked on intervention, as if more in the nature of an exciting adventure, without realizing the deadly danger. All now say that we had foolishly wasted too much pity, and had labored under an egotistic, if well-meaning misconception, of our ability and strength; we had instead gotten ourselves into a trap which now threatened our entire force with destruction and death. There was no question about it now—we had entirely underestimated these little peoples and their resources. We were not fighting in a war between little animals—but in one between intelligent beings, well organized and possessed of scientific powers of destruction. For even while I was thus thinking, one of their biggest shells, which must have been the size of a five-pounder, exploded with dreadful force, blowing one of our men to ribbons, and maiming two others.

How it all would have ended, I do not know; most probably in our total destruction. But to our joy and relief, badly needed help came to us unexpectedly. Welcome clouds of Urgandian reserve air forces hove into sight from over the horizon. We came to a new line of defence. Huge reinforcements which the Urgandians had brought up from the rear, well entrenched, stopped the general retreat all along the line, and compelled the onward plunging victorious Calintans and their allies to come to a halt. As we drew behind the sheltering lines of our forces, we heaved a sigh of relief. There was no doubt we were glad to be in a protected area once more after our terrific struggle.

I SHALL not go any further into the details of this war between the Urgandians and the powerful coalition against them, and our intervention on the side of our Urgandian friends.

The enormous new armies which Urgand raised, and the country's huge resources, brought about a stalemate between the contestants in the great struggle. After tremendous losses on both sides, an armistice was finally agreed upon. Calinta and her allies were willing to declare peace, especially as their diminished water supplies had begun to flow more copiously once again; while Urgand also agreed to a reduction in the price of water. Peace was declared shortly after.

Our own unit had emerged from the struggle not unscathed. We were tasting the bitter fruits of overconfidence, which has caused many a downfall in the past. We had lost ten men killed, and many were more or less wounded, some quite seriously. But we gave a good account of ourselves, in spite of our small number. Whatever else the Ioans may think of the men of earth, they found we were no craven cowards, for our men fought with the greatest bravery in face of the fearful odds against us, inflicting terrific punishment. And the fearlessness and might of the "Earth-monsters" will go down in the historical annals of Io.

Henceforth, we applied ourselves to the peaceful pursuit of rendering our "Martian" fit for our long return journey back to earth.

But the evil destiny which had pursued us, as if jealous of our invasion of the heretofore denied domain of interplanetary space, was not yet spent. For although the accident, which had prevented our intended exploration of the planet Mars, had fortunately and inadvertently resulted in the marvelously greater discovery of intelligent life on another world in our Solar System, with, perhaps, who knows what future consequence to man on earth, our misfortunes were not yet over. And although the result of our space journey has been brilliant and in many ways unbelievably successful, even if marred by accident and death, yet the evil spirit which dogged us was bound to exact his tribute—and from sources in which we would have refused to believe.

CHAPTER X

AFTER a conference between Lowell and myself, we decided that just as soon at the "Martian" was ready for its rigorous journey through space, we would embark on a short exploratory trip around the world of Io; and then speed straight for home and our loved ones.

"Much as we are fascinated by our experiences, and should like to stay longer," Commander Lowell said to me, "I know our men are getting quite anxious to go home—and for that matter, so am I."

"I am, too," I concurred. "Let's see: we have been away now well over a year."

"Yes; and it will take another half year to get back. So we had better get busy with our reconstruction, which is well-nigh complete. But first we must take a short exploratory trip around Io, stopping briefly here and there and at a few of the principal countries and places of interest. A month or so of that, and we shall be on our way home."

"It would seem a shame not to see the rest of it, now that we are here," I agreed.

So it was decided. Another few weeks, and everything was in readiness for our departure. News of our intended 'round their world visit spread rapidly among the Ioans, although our itinerary was not to include the late enemy countries, where much bitterness still remained, and which feeling included us "Earth-monsters" for our intervention.

CHAPTER XI

TWO weeks later, after several trial trips proving to the Commander the staunchness of the "Martian" and its full fitness for the long trip ahead of us, we made the final preparations for our circling of Io—and then for home. Having placed a definite time set for our return to our loved ones put us in a decidedly happy frame of mind, and all were eager for the start. Our departure from Delimas was scheduled forty-eight hours later.

In the late hours of the Ioan night, I was suddenly aroused from a deep sleep by a loud commotion on board the "Martian." I heard shouts, cries and the sounds of running feet, accompanied by blows, curses and yells of pain.

Instantly I was on my feet and into my clothes. I was joined by Commander Lowell and Lieutenant Harkness. Automatics in hand, we stepped out on the deck. The night lights had been put out; but in the gloom, lit up by the giant ball of Jupiter, we saw two men running toward us, followed by about a dozen others, yelling: "Stop or we'll shoot." Then the loud reports of several shots rang out in the quiet Ioan night, and one of the refugees stumbled and fell headlong. In the van of the pursuers, I perceived the huge figure of "Whitey," cursing horribly as he ran; his loud voice booming, "Get him, stop him!"

We recognized the man running toward us as Professor Harry Saunders, the astronomer. Spying our little group, he ran to us screaming: "Help! A mutiny! Murder! Save me!"

At the same time, "Whitey" and his fellow conspirators, seeing our revolvers glinting in the bright Ioan night, called loudly to us to surrender, or they would kill us. The next instant we ducked for cover; shots rang out, bullets wheezing past our ears.

"Let them have it, the scoundrels," Lowell shouted to us, and we returned the fire, one of them letting out a yell of pain; the rest dodged behind various points of shelter, and began firing furiously at us. For some time the battle continued. As we crouched, firing in the direction of the gun flashes which stabbed the darkness, Professor Saunders, in breathless, jerky words, his voice shaking with emotion, told us what had happened. He and a number of others, who occupied the same quarters, were suddenly surprised by the appearance of the mutineers, armed with revolvers (after the war we retained our weapons), ordering them to surrender and submit to being tied hand and foot. He and Carl Snyder, the chemist, being near the door, and seeing an opportunity while the rest were being tied, broke away and ran toward our cabin.

"I heard them say that now they had everybody on board tied hand and foot except the three main commanding officers—they would get you next. We took the chance to run and warn you—the devils! they shot poor Snyder," and his voice broke into a sob.

The full import of what he told us, together with the perilous position in which we were suddenly placed, burst upon us. In a flash I remembered "Whitey's" plan to rob the Ioan's sacrificial temple grounds.

"Good God!" I exclaimed. "That devil has evidently won over ten or twelve of our men to his evil plotting, and intends to capture this ship."

"It is true," Professor Saunders exclaimed, "I heard them say while they were binding the others, that as soon as they brought back a big load of gold and things they would leave us all outside on the ground, and take off for home. What are we going to do? What are we going to do?" he wailed, and wrung his hands.

There now was no doubt about it. "Whitey" and his men intended to seize the ship, carry out their bold plan of obtaining by force and treachery the wealth which

had aroused their cupidity; then return to the earth by themselves, most likely with a tale that would explain our disappearance, leaving us deserted on this far-away world with no chance of ever returning.

But we were not given much time to think or plan. We could hear "Whitey's" hateful voice directing his gang. The mutineers were edging around us, and in another few minutes would have us surrounded and catch us with their fire from behind. Calling to Professor Saunders, who was unarmed, to follow, we dodged and ran back through open doors, around corners, passageways, from deck to deck, fighting as we went. Finally our ammunition began to give out, and our situation became desperate. They kept calling on us to surrender. We were surrounded on three sides, and they were gradually manuevering us out into the open. Professor Saunders screamed, as a searing bullet struck his side, leaving a flesh wound.

"I'll never surrender to these blackguards," Lowell cried. "For the entrance to the ship," he commanded. "Quick, before they cut off our retreat.

We were just then nearer the ship's outside entrance, the only one kept unsealed, then were the mutineers; and we made a run for it and leaped outside. Quickly as we could we ran on, pursued by the scoundrels, who were firing repeatedly at us; to which we could not reply, as we felt the necessity of saving our last few rounds of ammunition. They followed us for a long distance, heading us off from the city; but we managed finally to elude them in the dark and hid among some low rough hills, strewn with huge boulders, and covered with low vegetation.

WEARY and spent from the fatigue and excitement of the grueling chase, we rested, and dressed Professor Saunders' wound, which fortunately was very slight. We discussed ways and means of recapturing the ship; and if possible, of forestalling "Whitey" and his men from carrying out their wicked raid on the city.

"We simply must do something to circumvent those rogues," Lowell spoke in low, tense tones—"at least try."

"Those devils!" I exclaimed, "I never dreamed we had such men on board. That 'Whitey' and his two pals are at the bottom of it all. They sure mean to leave us marooned here—we may never get back to the earth again."

"That would be terrible, terrible," remarked Professor Saunders, his voice hoarse with emotion. The poor man was totally exhausted.

For a while we lay there, rueful and silent.

"Commander Lowell," queried Lieutenant Harkness, "Do you think—if these dogs leave us behind—that the Urgandians have the resources to enable us to build another space-ship?—you could no doubt make another set of plans; I know it would no doubt take a long time."

"Off hand, it is hard to say. Their engineering resources are undoubtedly of a high order, and in point of theory, no whit inferior to ours; but whether on the scale required I cannot tell. Perhaps they do not have all the materials necessary, although it would seem they have. No doubt it would take some years.

"Shall we find our way back to the ship?" I suggested.

"No, that would be risking suicide," emphatically spoke Lowell. "Those rascals will no doubt be on the lookout and take us in ambush. Better go back to Delimas and warn the authorities—those little fellows are resourceful, as we know; and with their help we might do something." With that he arose and led the way, ordering us to follow.

We moved cautiously in the dark, listening to every sound, fearful of a surprise attack. All was silent, the low swaying trees and the landscape presenting a queer, ghostly appearance. We trudged on in silence, our way rendered difficult by the innumerable rocks and boulders strewn about. In our precipitous flight, however, we had lost our direction, the rocky low hills which surrounded us making our progress all the slower. Vainly we looked for the glow of the far-off lights of Delimas. For a time we were quite lost and fearful of arriving too late.

ARRIVING at the top of a hill, we were heartened by the sight of the city lights in the distance; and getting our direction, hurried on. Daybreak was not far off.

Just then the sound of far-off firing reached our ears. We stopped, startled. The firing grew in intensity and attained great volume. The gentle breeze wafted to us the faint hum of some great commotion; and in the distance we could see the sky over Delimas filled with moving lights, like numerous fireflies. We knew these to be the Urgandian flying machines, their little searchlights penciling the darkness.

No need to guess what was happening. Those scoundrelly mutineers had embarked on their mission of pillage and were no doubt interrupted and engaged in battle with the Urgandians. It gave us a sinking sensation in the stomach; and I, for one, was filled with hot shame, lest our little friends should think this unwarranted and treacherous outrage was sanctioned with our authority—perhaps believe the entire expedition was implicated. I could picture the popular indignation at the outrageous robbery, and above all, their fury at the desecration and despoiling of their great religious shrine, which to them was very holy.

What would they now think of us? What would my friend Ospana think of us men of earth, of whose much vaunted civilization I had unwittingly boasted at times. Their esteem for the inhabitants of the earth would surely not be increased; indeed we now would be real "Earth-monsters" in their estimation. What an introduction to each other of two great intelligent peoples of two widely separated planets! For shame! There came back to me thoughts of the corsairs of other days. Through my mind ran the story of the Spanish Conquistadors, their infamous cruelty, their ruthless dealings with the helpless Aztecs, the Incas and the Mayas . . . Was this just the beginning? . . . was history going to repeat itself in another new world? "The beasts!" I muttered aloud, and clenched my hands.

WE redoubled our efforts to reach the city. As suddenly as it had commenced, the firing receded in volume, died down, and after a few sporadic shots, died out altogether. Everything grew quiet.

What had happened? Had they gotten away with it? . . . Had they gone by now in the "Martian?" . . . And were we doomed to spend the rest of our lives on this far-away small world? These questions we all asked ourselves. Or . . . could it be . . . could it be . . . devoutly hoping it were so . . . that the tiny Ioans were well able to take care of themselves? . . . those scoundrels attempted something they could not bite off?

CHAPTER XII

THE pale dawn of the Ioan morning appeared over the horizon, and the day broke with the suddenness characteristic of their world. We were on the outskirts of Delimas, and rapidly as we could we hurried toward the Great Chiefs' headquarters.

On all sides we could see evidence of great excite-

ment; large numbers of the inhabitants were up earlier than usual, filling the streets, and eyeing us hostilely. The news of our coming spread instantly, and almost immediately we were surrounded by fleets of their circling fliers, following and keeping a close watch over us. Dense crowds hemmed us in and watched our every movement. In the thousands of little eyes, we could read suspicion, enmity, resentment. We waved our customary greetings, smiling as friendly as we could, and in a brief while presented ourselves to the central authorities.

As we were ushered into the presence of the Great Chiefs, we all bowed low in our usual manner. The same suspicious stare and icy coolness, even hatred and hostility, which we had encountered all the way through the streets, greeted us. Gone was the friendly spirit of former times, the gracious, ever-welcoming assurance of these little people. I fancied even a look of loathing for us "Earth-monsters," as they silently beheld us.

With his characteristic calm and dignity, Commander Lowell spoke briefly and as clearly as he could in their difficult language.

"Your Honors, the Great Chiefs: I, as the commander of our expedition, as well as my subordinate officers here, are greatly grieved over the unfortunate occurrence. To the best of our ability we sought to prevent the wicked design of a small group of our men, who had unscrupulously seized the power, but we were unable to prevent it." And he went on to explain what had happened, but in that broken way which one does who is unfamiliar with a foreign tongue. In fact, I doubt if at first he made himself perfectly intelligible, for as he spoke, they stared silently and hostile. They finally understood something of our grief, and seemed to realize, in part at least, the nature of the whole unfortunate happening, and that it was beyond our control.

"You 'Earth-monsters' perhaps speak the truth," senior Chief Tanquidor finally deigned to speak, in his strong tenor voice. "That some of you could do what they did indicates the low nature of your being. Our teachers, in the very beginning, had spoken of some vile characteristics which you creatures of earth possess, loathsome to Lonars of Io. Are all the 'Earth-monsters,' of whom you say there are many millions on your world, as wicked?"

Commander Lowell assured him that on earth there are good and there are bad, but fortunately the good are in the vast majority.

"The 'Earth-monsters' were unsuccessful in their unthinkably wicked attempt," Chief Tanquidor presently went on, his ringing voice stern, a hard look on his face, his splendidly robed small figure erect and dignified in his bejeweled, throne-like chair. "They reckoned without our power. They were overtaken and surrounded; and everyone that remained alive is now in chains and our prisoner, to whom justice will be meted out in the usual way and according to the custom of our land. Your other 'Earth-monsters,' whom we found bound hand and foot on the ground near your big space-ship, are now also our prisoners; until we can decide on the measure of their guilt, for we do not know enough of your ways and customs to judge at once."

At this Commander Lowell hastened to assure him that our other men were guiltless and honorable, and were no party to the crime. "We have no objection to your laws dealing with the guilty ones as you see fit; nay, I, myself, shall see to their punishment in the full measure of their guilt. But I must beg of you to release my other men, so we may depart in peace."

"Our Council of State meets today," the Chief answered, "and you will be apprised of our decision." With that the Ioans arose, and signalled that the audience was over. Permission to see our men was granted.

THE four of us walked dejectedly toward the stockade where the men were imprisoned. On the way, we marveled at the power and resourcefulness of these little men, for so we often called them. We wondered how they managed to take "Whitey" and his desperate group alive, well-armed and determined as they were—at the power of these Liliputians leading their huge captives subdued and in chains. How did they do it!

"Got to hand it to those little chaps," Lieutenant Harkness remarked. "They are sure no slouches when it comes to having something done. I am wondering how they did it. Surely 'Whitey' and his gang must have put up a desperate fight."

"I'd have given a great deal to have seen these Liliputians leading those rogues in chains like huge poodle dogs," said Professor Saunders; and we all laughed at the thought.

Arriving at the stockade, although we had expected to find them imprisoned, we were not quite prepared for the sight that greeted us, and were astounded, to say the least.

The stockade in which the men were confined was an open-air affair, which had been used during the late war for prisoners. It was about ten acres in area, and enclosed with a steel barred fence, three feet high, amply high for an Ioan. At one end of the enclosure was a very large building, as buildings go in their world, also used as a prison of some sort. However, the captors did not count on such a low fence being adequate to prevent their huge prisoners from escaping.

For, all around a large open-air, mostly roofless sort of pavilion, which ran the entire length of one side of the enclosure a few yards from the fence, were spaced powerful steel and concrete posts or piers, solidly imbedded in the paved floor. And to these, securely held by stout steel rings, our men were chained; one chain around the neck, another chain hobbling their legs and also fastened to the posts. These chains were of sufficient length to permit of a fair measure of movement, and about the thickness of a finger, but amply powerful to withstand any man's greatest strength. The sight was almost ludicrous, and if it were not for the tragic situation was almost enough to make one smile.

Our men were glad to see us and greeted our appearance with the greatest expressions of joy. But the guilty culprits, soiled and grimy-looking, were silent and morose, a hang-dog look on their faces, for all the world like whipped dogs. At the sight of the mutineers, chains dangling from their necks Professor Saunders could not refrain from laughing out loud; at which they bowed their heads and looked shamefaced; and "Whitey" growled, "Shut up, you silly star-gazer."

We were not allowed to go inside the stockade, but spoke to our men from the fence, under the watchful eyes of several of the little guards, their small but dangerous weapons unslung ready for use.

From the men we soon learned everything that transpired: How "Whitey" and his two evil co-plotters had secretly won over (as they now shamefacedly confessed) eight of the crew to take part in the robbery, by playing on their cupidity; the easy prospect of untold riches dangled before their greedy eyes: The plotters' scheme to seize the great, ready-to-hand wealth of the holy amphitheater and flee with the "Martian," leaving all the rest of us marooned on Io.

From them we learned how the miscreants were interrupted in their work of robbery; of the sounding of the alarm; of the flight through the streets, followed by the armed Ioans. How they were surrounded, and stabbed at and shot from all sides and from the air; and how, after killing numbers of the little folk, five out of their eleven were killed by the streams of Urgandian bullets, which riddled their bodies like sieves; and the

rest finally overcome by the release of gas shells and rendered unconscious. How, when the culprits came to, they found themselves chained and hobbled, their arms fastened behind them, a strong steel cable around each of their necks. And how, finally, prodded from behind by many little swords, which drew blood, and pulled not too gently from the front by the cables around their necks, which were fastened to fleets of their tiny but powerful tractors—the surviving culprits were led to the stockade and chained like wild animals.

CHAPTER XIII

HERE was a dilemma indeed. Sadly we four returned to the ship. It was deserted. At our approach, we found a small guard of Ioans guarding the entrance. At the command of an officer, and no doubt acting under orders, they immediately departed and left us to ourselves.

A cursory examination revealed that no harm of any kind had been done to the ship or its machinery. However, we found that all the fire-arms, including our sole remaining field piece, had been removed. The Urgandians were taking no chances. We made ourselves as comfortable as we could. There was nothing we could do in the meantime but await the outcome of the Great Council of State meeting, which should decide the fate of our men.

IN the middle of the night, a light knocking on our cabin door brought us to our feet with a shock, our nerves being already overstrained to the breaking point. There stood the tall figure of Lieutenant Harkness, and, tiny by his side, I perceived my friend Ospana.

Perched on a table under the rays of an electric light, the little fellow, looking serious and sad, proceeded to give us some information which made our faces blanch.

"Friends: I come to warn you—you must flee, if you would save yourselves. I come here at great danger to myself—but I have grown fond of you and cannot bear to think of the horrible fate that awaits you."

He paused, and we urged him to continue.

"The Great Council of State has decreed the death of every 'Earth-monster' on Io. . . . Your arrest has been ordered to take place the first thing in the morning . . . Oh, my friends, flee, flee, while you can."

The little fellow was actually grief-stricken.

"But why, my dear Ospana," I asked, "do they wish to include our innocent men in the death penalty?"

"They are afraid to trust you further. Besides the crime is considered the most heinous possible, and unpardonable. And then the religious and sacrificial authorities have so demanded. They say: 'Thus only, will the great sin and sacrilege against our god be atoned for.'—" His vibrantly rich masculine bass voice turned low: "At every occultation period, nine of you at a time are to be taken to the Sacrificial Altar; and there, one by one, in the prescribed manner, by means of derricks, you will be cast into the great Burning Urn to die . . ."

At his last sentence, we were frozen with horror.

"Flee!" our little friend entreated, and he hastily departed.

AFTER Ospana's departure, we hastened to lock the outside entrance to the "Martian"—secure, we knew, against anything the Ioans could immediately bring to bear. The four of us then retreated to the Commander's cabin and held a long council.

Lowell suddenly jumped to his feet. "I'll never consent to leaving our men to die a horrible death. I know you also feel as I do."

Instantly he was the marvelous, dynamic, resourceful man we knew. "We can save these men, and ourselves—and we will!"

"We are with you, to the last drop of blood, Commander Lowell," I calmly said.

"Count us in, too," the other two men offered.

"There is only one way—strategy—force—quickly and immediately applied," the Commander spoke. "We will arm ourselves with the portable oxy-acetylene blow-torches and the powerful cutting tools here on board. We still have our automatics, besides a few spare ones and a fresh supply of ammunition, which I see the Urgandians have overlooked in my secret locker. There are still two hours to daybreak. We will make our way at once to the prison; overpower the guard as silently as we can; and with our blowpipes and tools liberate the men, and make a run for the ship. Our torches should cut through those little chains like a knife through butter; and the whole operation should not take but a few minutes."

"I see no other course before us," agreed Lieutenant Harkness, a brave yet cautious man. "Still, grant that our sudden attack will succeed in freeing the men, how are we going to cut our way back to the ship with our skins intact? The Urgandians are not asleep. No doubt they will be about our ears in no time."

Commander Lowell stroked his forehead thoughtfully. "What you say, is true: I have thought of all that. But there are several factors in our favor. To begin with, the amphitheater from which "Whitey" and his gang tried to fight their way back is almost two miles away—besides, in their greed, they dallied a little too long.

"The stockade and prison is a short distance from the 'Martian'—considerably less than a mile. As fast as our men are freed, they can break into the prison at the end of the stockade, and possess themselves of our arms stored there by the Urgandians. With the entire armed strength of our expedition, we should give them a good fight and cut our way back. It is do or die!"

ARMED to the teeth, cutting tools in hand, we stole through the darkened streets of Delimas, moving as rapidly and as quietly as we could.

Arriving near the stockade, and aware that our presence would be noticed, we approached with studied slowness from behind the walls of the prison building at the end, whose roof rose several yards higher than our heads. Quickly and silently overpowering a few guards stationed near the corner, we leaped the stockade fence—and our oxy-acetylene torches were soon releasing our men one after the other in rapid succession.

As fast as the men were cut free of their chains, they began to help with extra cutting tools we had brought along for the purpose; while still others, at Lowell's command, quickly cut and smashed their way through the comparatively thin bars and doors of the prison building to where we knew our confiscated weapons were stored.

While we worked swiftly and with dispatch, the alarm was sounded. Other guards saw us, and realizing our object, began firing their little weapons; and in no time, there was a great hue and cry. We could hear the running of innumerable little feet, shouts, commands and the whining drone of little flying machines. The whole thing was only a matter of but a few minutes, but in that time the general alarm was fast bringing large numbers of the little fighters all around us.

Through the night air, as we worked fast and desperately, came the sound of bugle calls, the shrieks of many sirens. We knew that meant their fighting soldiery were being called to the attack. The rattle and roar of many motor vehicles came to our ears, the increased rattle of firing, the sharp commands of voices; and in the distance, fast approaching, was a huge fleet of their fighting air machines.

The few culprits who had survived, and who were the

cause of all this, begged piteously to be freed and allowed to help in the escape. We did, with the understanding that they were our prisoners.

NONE too soon our entire force were running as fast as our legs could carry us, back to the "Martian." In the rear, covering our retreat, Colonel Ferguson, with a squad of men, acting on orders from the Commander, were fighting a rear guard action with machine guns, and falling back as fast as they could. Half way, Urgandian forces coming from the opposite side were rushing to head us off. Over our heads, many of their fighting craft were pouring a hail of death-dealing bullets. The firing of their soldiery was gaining in intensity from all sides.

In turn, and forced to defend ourselves, we fired as we ran, killing many of them. With fixed bayonets, our force hacked and shot their way through the streets, a dozen of us with Commander Lowell himself leading, acting as a spear-head. The ship now was but a short distance away. Our pursuers closed in on us from all sides, many of them fearlessly driving in close and discharging their weapons at close range. I kicked savagely at a number who placed themselves right in my way. We slashed out, shot at them, slung them aside with our rifles, even knocked them down.

Already some of our men were down, their blood-curdling death screams sounding above the din. I felt blood oozing from many small gaping wounds in my arms and legs and body. The main body of the Urgandian fighting forces was fast approaching; already the larger missiles of their heavier artillery were beginning to explode in our midst with great violence; already faint signs of their asphyxiating gas shells were beginning to come over. If we did not reach the ship ahead of their main fighting forces, we knew we were lost.

A bare few rods from the "Martian" the fire became withering. I was beginning to feel slightly dizzy from their gas shells and weak from loss of blood. Several of our men who suffered fractured bones from the increasingly heavy fire of their artillery were being supported or carried by their fellows. One of their large shells exploded not more than thirty feet from the entrance, maiming several, the mangled bodies of "Whitey" and one of his pals falling to the ground.

AT last, and none too soon, the foremost of our men reached the protecting lee of our space-ship.

Springing into the entrance, Lieutenant Harkness and a number of others planted machine guns at the portholes and opened a terrific fire on our pursuers to cover the retreat of our running men. Quickly planted machine guns in front of the entrance held our flanks and mowed down our assailants as they attempted to rush from either side. Just in time the men dashed inside the "Martian," with Colonel Ferguson and his fighting rear guard close behind. Standing on the outside, Commander Lowell, pale and determined in the light of the early Ioan morning, a smoking automatic in either hand, was directing the last minute escape.

As the last of our men bolted through the entrance, Commander Lowell, the last to go in, and myself leaped inside—and not a second too soon. For the Ioans, arriving by now in full force, had concentrated a terrible fire on the entrance, in spite of the counter-fire of our men, who were now blazing away from every porthole.

The next instant, the huge steel door of the entrance was shut tight, and bolted into position. Every porthole was closed.

COMMANDER Lowell gave the order to lift. The throb and pulse of our mighty lifting generators began to sound. Outside, the Ioans were beginning to throw their largest steel hawsers over the body of the "Martian," to prevent our departure.

As the full power was turned on, the repulsion generators roaring deafeningly, I could feel the "Martian" throb and vibrate; and the next few seconds took off the ground, snapping the few cables they had already thrown over us like threads. Another few minutes and we were high above the surface of Io, and safe.

CHAPTER XIV

SIX months later we were cutting through the upper layers of the earth's atmosphere. Straight and true our great space-ship had sped over the unthinkably distant hundreds of millions of miles from Io to our earth; the nearing, colorful globe of our home abode, a welcome sight.

Thousands of miles away, while still out in the voids of space, with the shining orb of our beautiful home-planet beckoning us on, Commander Lowell had radioed our return. At first faint, then growing ever louder and clearer, long distance operators from many widely scattered places on the globe were sending their welcoming greetings in response to our signals; anxiously awaiting the glorious return of the earth's first voyagers of space.

STRAIGHTENING out a few miles above the surface, we found ourselves over central Europe. Diving lower, we sped on toward our goal, it being the Commander's plan to land on the same airport that saw our epochal start.

We sped over the fields and cities of Europe; the while our progress, radioed to the whole world, was watched by countless cheering people, our whereabouts from then on flashed ahead. Straight on we sped at a three hundred mile an hour clip, our propulsion exhausts roaring strangely in the earth's atmosphere after such a long silence in the tomblike quiet of outer space.

Thence out over the broad Atlantic, passing ships blowing their sirens; battleships saluting us with guns. And then slowing up over the great harbor of New York, the waters dotted with beflagged craft, the air full of circling machines.

Our arrival was a signal: pandemonium broke loose. Entire Manhattan and Greater New York turned out to greet us; whistles blew, guns boomed, and millions cheered from the streets, and from housetops.

Slowly we circled over the city, descending very low. The populace was fairly beside itself. We crowded around the open ports; the sight and sound of these millions of people shouting their welcome was music to our ears.

Then our great ship lifted somewhat and sped on for our home goal over village and hamlet and city; everywhere wild crowds gesticulated and welcomed us until we hove in sight of the home field from which we had started. As we descended low, preparing to land, I looked out and saw the vast multitude gathered below, an army of soldiers and police endeavoring to restrain the frenzied masses of humanity. Just as eagerly we awaited the final landing, and the feel of good old mother earth once more under our feet.

Thus ended our great journey through space, after an absence of nearly two years, having covered a total distance of 927,455,600 miles.

THE END.

On the screen before his eyes, he saw that two ships of his squadron had taken on a sudden eerie luminescence.

Illustrated by MOREY

THOUGH the benefits that might be derived from wholesale murder called "war" hardly balance the harm, it must be admitted that some good always results. For, though it seems sad, it is true—man's inventive powers are at their peak when he is engaged in battle. We are not at all certain that the instinct of self-preservation is altogether responsible for this sharpening of wits. However, in a war entirely unasked for by the earth people, the enemy in the story prepares for its own destruction in its own over-confidence. But there is no doubt that they have a powerful weapon —more powerful because it remains so long a mystery.

Invisible Ships

By Harl Vincent

Author of "The Seventh Generation," "Barton's Island," etc.

CAPTAIN STONE of the Fifty-first Terrestrials ("Rocks" to the gang in the barracks when they were sure he was not within earshot), stood in the open door of the C. O.'s office, looking gloomily out over the plains of Thrygis in the direction of Seritanis, queen city of the planet Venus.

He meditated on the changing fortunes of war and cursed the recent move of the Martians which had cost him the lives of the two best men in his outfit and was now bringing new terror and despair to the cities of the allied planets, Earth and Venus.

When the Allies, at the end of the sixth bloody year of the Second Interplanetarian War, threw their entire resources into the heavens in the form of vast fleets of space ships, it appeared that the war was won and the Martians effectually held off from the two inner planets. Indeed, the red planet itself was so thoroughly blockaded as to shut off the source of supplies to the many ships of the enemy still giving battle to the allied forces.

Then had come this startling new development. Seritanis, a mere thirty miles distant, was crumbling. The great flat-topped pyramids that were her buildings yielded one after another to the devastating force of a mysterious ray from far out in the heavens, the proud structures raining into the streets and crushing the populace under enormous piles of sand and finely divided metallic particles to which they were reduced. And panic reigned in all other cities of the planet, none knowing when a similar bombardment might be started elsewhere.

The destroying rays generated no excessive heat in the annihilation of the tall edifices and carried with them none of the deafening sounds that accompanied the disruption of the atmosphere by the various destructive energy beams previously used. And more baffling still was the fact that the source of the ray shifted constantly and thus rendered useless the direction finders of the Allies. The scientists of Mars had discovered a new and deadly weapon.

"Rotten war!" the captain grunted. "Wonder if it'll ever end." He tossed away the frayed end of his cigar and turned to enter the room.

The major, "Bulldog" Carlson, was reeling off a tape from the ethergraph recorder. "Look at that, Stoney!" he roared, tossing it to the captain, "Orders from the Home Office. All of our ships on the bum, too; every damn one of them needing repairs and some so bad we hardly dare trust them out of the atmosphere. And those idiots back home order us to send out every last one after a will-o'-the-wisp or something. Can you beat it?"

Captain Stone scanned the tape from end to end, frowning angrily. "We've reported fully too, sir," he growled. "The dumb-bells! It looks like suicide to me, for a lot of the boys."

"Sure is, and they know it down there at the Home Office, too. Lot of slide-rule navigators and story-book fighters, they are—what can you expect of them?"

"Besides, they've just sent this batch of recruits. Have to use some of them or the ships'll be undermanned."

"Yes," the C.O. grated. "Just to make matters even worse. A flock of greenhorns to fight with. Well, such is life—in this lousy war anyway. Gotta do it regardless, Stoney. Let's hop to it."

He glared savagely at the offending tape and pressed a button. In a half hour the entire force would have reported, the regulars at their posts and the recruits for inspection.

"I'll command my regular ship, sir, the 9B5?" Stone inquired. "And the usual squadron?"

"Certainly. What shape are they in?"

"Fair. At least we'll keep 'em going. But I've lost my two best men, you know—Hargreaves and Smith. In the Rudan Theatre collapse, the first of the new disasters. They were in Seritanis on leave."

"Oh, yes. That's bad, Stoney, but I don't see anything for it but to grab yourself a couple of good recruits and do the best you can under the circumstances."

"Yes, sir, I will, sir." Captain Stone forgot to salute as he turned on his heel. They were close friends, he and the C.O.

HIS grouch intensified as he wandered across the field. Hargreaves had been a crack engineer and Smith the finest ray operator in the service. He had no heart for the picking of recruits to replace them, so left the job to his first officer and ducked into the 9B5 to give her a final looking over.

The little scout ships of the Fifty-first sure did need fixing, he thought. And all on account of this neglect by the Home Office. A thousand of them there were at the base in Thrygis, good ships and speedy, but they had been considered useless during the past few months. The big cruisers and battleships were far better for blockade and defense lines. Never counted on needing the little fellows again, had they?

Now they were wanted by the Home Office for immediate service, these trim little "9" ships, and they

were in rotten shape for any kind of a campaign. Many of them had but one ray projector that could be operated; others had no spare oxygen apparatus; some relied on a single generator of the gravity energy which propelled them, the spare generator having burned out months before and no replacements being available since.

But the men responded to the call with alacrity. They were tired of inactivity and besides, the niners always managed to come through somehow—most of them.

In groups of five the niners took off; they were to search for the source of the new Martian ray in independent squadrons, each squadron with its flagship and commanding officer, whose task it was to direct their movements and to keep in constant touch with headquarters by etherphone.

Captain Stone, officially recorded as commanding officer of squadron 101, sat in the control room of the 9B5 when she took off and, gravity field intensified to full repulsion from the planet, soared up through the low cloud ceiling and into the blue. Before him were two screens, one connected through magnetic waves with the master position chart at headquarters, the other his own locally operated teleview. At his flicking of a tiny lever, the latter was illuminated and he saw the four egg-shaped vessels that followed closely behind. His squadron! His grouch softened as he thrilled anew to the responsibility, to the call of battle.

On the replica of the master position chart glowed hundreds of tiny light flecks, some red, some blue and some green. These were the ships of the defense fleet in the sector to which they were heading, the colors distinguishing stationary supply depot, cruiser and battleship, respectively, and all accurately locating the various units by means of the electro-magnetic waves relayed through the great re-transmitter at Thrygis. He studied this chart carefully for a time, his brow wrinkled in thought. In the black background, behind the colored lights, was a reproduction of the heavens into which they were boring. The sun, partly masked in the reproduction by a ray quencher, shone hazily in the upper right hand corner. He spoke into the microphone, whose support was strapped to his chest.

"Pilots attention!" he snapped. "Bear toward quadrangle 298 and head for the two cruisers in its southwest corner. Then pass between them and head for Alpha Centauri. Acceleration maximum."

The voice of the loud speaker brought four "Yes, sirs," to him from the pilots of his other vessels. His own pilot, a few feet away at the controls of the 9B5, waved his hand and grinned. The ship surged violently ahead and an immediate rising whine beneath their feet told of the functioning of the internal gravity mechanism and acceleration compensators, without which their tremendous speed in outer space would be impossible for the human body to withstand.

"H-hm!" Stone grunted. "Good thing those are working. Hope they stay that way. How'd you like to be squashed flat by the acceleration or go knocking around in the ship like a peanut in a barrel? Are we out of the atmosphere, Dan?"

"I wouldn't, sor—answerin' your first question," answered the pilot, Dan Healy, "we are, sor—answerin' your second. And niver a flicker of the timperature indicaytor, sor."

Healy was inordinately proud of his ability to bring any kind of a space ship in or out of an atmosphere without heating the hull plates unduly. It was a delicate touch, that ability to sense the precise balance between speed and atmospheric friction at which the temperature might be kept from rising above a safe point.

Someone was standing before the captain now and he looked up from the chart to see a tall youngster in the uniform of the scout service and with the insignia of the Terrestrial War College on his sleeve.

"Another of those damned dudes that fight by slide-rule!" he growled. "What's your name, man, and what do you want? Speak up!"

The tall rookie flushed hotly, then paled. The reputation of "Rocks" could not have escaped him in the bunk house, however short his time in the service. Hard as his name they said this captain was, second only to Bulldog Carlson, the C.O.

"Yes, sir—beg your pardon, sir," he stammered, "I'm the new beam apparatus expert. Victor Masters, sir. I wanted to report the stern projectors out of order."

"Hmph!" the captain snorted, eying him up and down with the disdain of the old campaigner for the college-bred under-officer. "Didn't you think I knew it? Expert are you? Well, why in hell don't you fix 'em instead of standing there like a ninny and shaking like a leaf? What's the matter—scared?"

"Yes, sir. That is, no sir. But there are no spare parts. We're defenseless astern, sir."

Captain Stone still surveyed the recruit contemptuously. A college boy! Next thing the kid'd be telling him how to run the war. And he was white as a sheet; shivering. No guts; none of them had any guts. Suddenly he laughed.

"Victor, eh?" he roared. "Swell name for a fighting man! Bet you've never seen a scrap in your life. You'd run like the devil was after you if you did. Learned how to retreat by reading it out of a book, didn't you? And now—Victor—run right along, prance out of here and back to your ray apparatus."

The rookie was standing stiffly at attention. His cheeks were very white indeed and his eyes burned strangely.

"Yes, sir," he whispered hoarsely, through set lips, "Very well, sir."

His heels clicked smartly as he turned and walked stiff-legged to the communicating door. The captain exchanged winks with Dan Healy, who was grinning in appreciation of the scene. At the door this amazing recruit turned around and they saw that a deep flush had replaced his former pallor.

"What do you think of Hubert as a fighting name?" he asked softly. Then he was gone. Dan Healy turned suddenly to his control panels, his face red and his shoulders shaking.

"Well, I'll be damned!" the captain muttered. "Now who do you suppose it was told him my name is Hubert?"

Discipline was lax on the niners. On a battleship, or on one of the cruisers even, an under-officer would have gone to the brig for addressing a superior as had this recruit. But Stone did not even rise from his seat. True, he glowered with rage for a moment. Then something suspiciously like a chuckle escaped his lips. He hunched his shoulders and studied the maze of cross lines on the master chart. His squadron, he saw, was heading directly for the quadrangle he had specified.

Promptly forgetting the incident of the fresh rookie, he gave himself over to speculation as to the outcome of this mad search of the heavens for the mysterious destroyer. What hope was there of locating so intangible a thing? What chance of their success?

A HALF an hour later they had passed between the two cruisers and were heading into the void. A heliogram from one of the big ships advised him there was no indication as to the possible location of the generator of the new rays; direction finders, both magnetic and reflecting, were still of no avail. The great telescopes were searching the skies in vain, they reported. Certain it was that the source of the terrible energy was

outside the defense lines. But whoever heard of a destructive beam which could be projected more than fifty thousand miles through space and from a constantly shifting projector that must be carried at the speed of light in order to cover the angles indicated at five-minute intervals? It was a hopeless and thankless quest.

Etherphone advices from headquarters told of the continued destruction in Seritanis. Estimates of the total number of lives lost ran into the hundreds of thousands. The populace was fleeing the city in all possible haste and so great was the crowding of all roads and air stages that hundreds of lives were being lost in the panics and rioting that resulted. Police and military authorities were entirely helpless.

Orders were to patrol the blackness out here between sixty and one hundred thousand miles from the planet, with a continuous watch at the direction finders. That was the job of Masters, the new ray operator and beam apparatus expert. Captain Stone's thoughts again dwelt on the rookie. Better take a walk aft and see how things were coming along in the cubicle where the dude was stationed.

Victor! He snorted as he thought of the recent conversation. But a glance into the screen of the teleview erased these thoughts from his mind in an instant. He froze with horror. Pictured on the screen before his eyes, he saw that two ships of his squadron had taken on a sudden eerie luminescence. Then, in two puffs of vapor, they vanished! Snuffed out like candles. The enemy was near!

He pressed a button and shouted into the microphone, "Masters! Masters!" Why in the devil hadn't the dude found them with the direction finders and told him?

There was no reply. "Hold to your course, Dan!" he bellowed. "I'm going aft."

He dashed from the control room and went roaring through the passage to the room of the intricate beam apparatus. Victor Masters lay face down beside the pedestal of one of his direction finders. He dropped to his knees and rolled the limp body over, lifting the eyelids.

"Fainted, by God!" he exclaimed in disgust. "Got a line on the enemy and keeled over like a girl. Scared—the swab!"

In the next moment he was at the companionway shouting down to the engine room for one of the oilers. Devil of a mess this was! Most important man of the crew, outside of Dan Healy, and he has to be a swooner—a white-livered skunk that faints in the face of real danger. And here they were, about to meet the enemy! Lord only knew how many of them there'd be or how close in they were.

"Here, get me a pail of water," he puffed, when the oiler came running, "Soak his head good—the bum!"

He was tearing open Masters' shirt as he spoke and he noticed the whiteness of the recruit's skin. Soft! All these youngsters from the War College were soft—yellow too. Why in the devil they trained these kids in a namby-pamby school with nothing but books to fight with and with silly drills and maneuvers, he couldn't make out—ever. Gave them their first bar without having won it in active service, too.

"Wot'll I do, sir," asked the oiler, who was standing by with a full bucket, "douse 'im, sir?"

"Yes, plenty. Snap him out of this and tell him I want him to report to me at once."

The captain rose and turned on his heel as the mechanic threw the entire contents of the pail over Masters' head and shoulders. He was disgusted with the man who had fainted and, besides, headquarters must hear of this latest development. Bulldog Carlson would have a fit of apoplexy when he heard of this.

DAN HEALY turned inquiring eyes on the captain when he again seated himself before the viewing screens.

"Fainted!" his superior growled. "This guy Masters flops like a scary woman when he sees trouble coming."

"No foolin'."

"Fact. Just like all these pretty boy, silk-stocking fighters, he hasn't got the——"

But Victor Masters snapped to attention before him as he spoke.

"You asked me to report, sir," he faltered, pale and shaking.

"I did. You—you ninny," the captain sputtered. "What have you to report? A weak stomach?"

"No, sir. I detected the beam, sir."

"Yeah! Then fainted, didn't you?"

Masters flushed angrily. "I did not, sir," he maintained. "I was struck down by emanations from the direction finder when this new energy was picked up."

"Likely story! Know they got two of our ships? Know how?"

"I know they got them, saw it in my local screen. But, captain," Masters' voice rose excitedly, "there are no attacking ships within range. I think I know what happened and how they are deceiving us with this new ray of theirs."

"Oh, you do, eh? What makes you think so?"

"It's a curved beam, sir. Had a line on it twice from separate angles. My idea is that they've a generator way out somewhere and are projecting this ray in a huge arc that ends at Seritanis; curving it by magnetic or other impulses and swinging it around constantly so that it always seems to enter the city at a different angle. It was an accidental contact of the ray that destroyed your two vessels, and a lucky thing it is it didn't get us all."

Captain Stone stared at the man's flushed features. Might be something in this at that. He remembered that light rays are deflected by the force of gravity when passing a celestial body and thus become curved rather than straight lines. In fact, a set of correction factors which he used enabled him to allow for just such curvatures in his navigation of the heavens.

"Think you can locate the source?" he asked with a hint of new respect in his voice.

"I'll try, sir, and I believe there's a chance. I've determined one frequency I can identify with the ray and have the evidence of two angular measurements. If—if——"

"If what?"

"You'll have to change your course, sir."

Captain Stone purpled. "What do you mean?" he roared. "Want to tell me how to command this squadron?"

Again Masters paled and bit his lip. "No, sir," he stated, after a tense moment, "but if you'd like to locate this new menace, it will be necessary to work from a different course. We must be paralleling the orbit of Venus, traveling in the same direction and at the same velocity as the planet. Otherwise my measurements will be of no avail."

"H-hm, I see. You want to maintain a definite position with reference to the planet so as to get a base line. Sure, I get you. But, God help you if this is a bum steer. Go on now and get back to your instruments. You'll have your new course."

Masters saluted and was gone.

Dan Healy turned around with a twinkle in his eye. "The bye seems to know his business, sor," he said guilelessly.

"Shut up!" snapped the captain, bending over his chart.

Then Dan found himself very busy, as did the pilots

of the two other ships, for the orders shouted into the microphone called for rapid manipulation of the controls. The 9B5 vibrated to the throb of her atomic engines as additional power was called for to increase and stabilize solar attraction in swinging into the orbit prescribed by the ray operator.

The captain flipped a lever and called into the microphone to the youngster who had brought about this unexpected change in plans. "Got it, Masters?" he roared.

"Yes, sir, to a hair. Stand by, sir," the loud speaker blared. The rookie's voice had taken on new confidence.

"How the divil did the bye know our two ships was pulverized by a crooked ray, sor?" Healy asked.

The captain stared. "Lord!" I don't know," he admitted. "A couple of smoke puffs and they were gone. I didn't see anything else." Then into the microphone, "Say, Masters, you sure about this curved beam and that it's what got our two niners?"

"I am, sir. It was a chance contact as the thing swung on its measured course through the ether. That was when I first picked it up—just before it hit them."

"Certain?"

"I am, sir. Had it on three sights and they indicated a definite radius of curvature—but wait—here it is again!" Masters' voice broke on a rising note.

The captain peered into the screen of the teleview as if he expected to see the invisible ray playing on its surface. Maybe this young ray operator was a coward at heart but he sure did know his onions when it came to the technical end of his game. "Keep me advised, Masters," he ordered.

"Yes, sir—one minute." The voice from the loud speaker rose in pitch. "Five points—no, six—captain, I've got it! Focus in quadrangle 614, about ninety thousand miles from the planet!"

"Check it, Masters!"

"Right-o! Seven—I was wrong, captain . . . eight . . . nine. Here—wait! Of course . . . should have known—the thing's on an orbit of its own, swinging around the planet. A satellite of Venus!"

"What?"

"Sure—built by the Martians. Distance is correct as given, sir. The inclination of its orbit is—just a moment—I have it. Six degrees, twenty-nine minutes to the equator. Their velocity is just sufficient to follow the planet's rotation and keep directly in line with Seritanis with the exception of the six and a half degree swing either way which makes it still more difficult for us to locate them from the surface. Clever thing."

"Good work, kid!" Rocks was softening.

There was no reply from the loud speaker.

"Masters!" the captain called. Then, disgustedly, "Fainted again, by the Lord Harry! Guess he got the dope, though. Hop to it, Dan!"

Once more his orders rattled into the microphone and his three ships swung about on a new course.

"Will ye be goin' aft to look after the bye, sor?"

"Yes—dammit!" Captain Stone stormed through the communicating door for the second time.

MASTERS was prone as before and, in a fresh rage, the captain rolled him over. Rotten break this was! Why the devil hadn't he picked his own recruits?

The loud speaker in the ray apparatus cubicle was bellowing a frantic call. Parry, pilot of the 9C8, was yelling bloody murder. Enemy vessels approaching. The abbreviated squadron in danger! He forgot Masters and rushed to the emergency control box, plugging in and illuminating the master screen.

"What's this?" he shouted into the microphone. "An enemy fleet, you say?"

"Three cruisers, sir!" boomed the speaker. "Swinging in through quadrangle 41."

He peered into the sector designated and saw that Parry had reported correctly. Three of the great spherical battle cruisers of the Martian fleet were looming close. A glance at the still figure of Masters told him that no immediate help could be expected from that source.

"Hell's bells!" he yelled. "My ray operator is out cold, Parry. You all right? Are you, Farmer?"

"Yes, sir." "Right, sir," came the replies from the 9C8 and 9F1.

"Good. Break formation now and make independent attacks with your disintegrators as soon as you're within range. Meanwhile, I'll see if I can get our own ray working. Then I'll join you."

He turned to the mechanism of the forward d-ray projectors and fiddled with the controls. It was a long time since he'd fussed with this apparatus. He saw his other two vessels close in on the enemy, the purplish pencils of their d-ray reaching for the great globular hulls of the enemy cruisers. Then the vacuum tubes of his own projector glowed into life and he pressed the releases of the twin rays to make sure they operated properly.

In the screen of the teleview he saw that the three cruisers had spread out to form a triangle. Then, before he could shout his orders into the microphone, the three huge spheres melted into the blackness of the heavens; vanished as utterly as if they had been swallowed by some Gargantuan monster of space. Just blinked out, like snuffed out lights, and were no more visible in the screen. He couldn't believe his eyes, for the rays from his vessels had not yet contacted with their hulls. Besides, there was none of the fireworks accompanying the contact of the d-ray with a metallic object. Had the cruisers been destroyed by their own curved ray from farther out, if there was such a thing? He gazed at the screen, speechless with amazement.

"What is it, sir?" asked the voice of Masters at his shoulder.

But the captain gave him no heed, contenting himself with a series of bellowing sounds addressed to the microphone. Masters had come to, he knew, but what in hell good was that now? Parry and Farmer should know something about the fate of those three Martian cruisers. They didn't, though; the thing was as mysterious to them as to their captain. The enemy ships had simply disappeared without trace or an explanation of the phenomenon. Their master screens showed only the star-studded blackness of the heavens.

Masters, without further speech, had turned to his direction finders and was busily engaged with their mechanisms when the captain stamped from the cubicle and returned to the control room.

"What's up, sor?" inquired Dan Healy.

"Didn't you hear?"

"Sure and I did—from the speaker. But what does it mane, sor?"

"How in the devil do I know?" The captain's eyes were glued to the screen now and he resented even Dan's chatter. The etherphone was shrilling its insistent call. Bulldog Carlson wanted to know why in the bloody blank blank he hadn't reported. He threw the switch with a savage jerk and stilled the clamor.

Masters's voice came through the loud speaker. "I think, sir," he stated, "they've found some way of making themselves invisible and that they are closing in on us."

"Fiddlesticks! You stick to your direction finders, you yellow striped night school soldier!"

"I am, sir." Master's voice was steely but respectful. "It is the direction finder that gives me the idea.

I'm telling you that one of the enemy cruisers is approaching each of your vessels, whether you can see them or not."

"You're crazy as a coot! Invisible!" The captain rose from his seat in a black rage. He'd go aft and sock that nut of a rookie in the eye. Knock some sense into him.

Then the lights went out; just blinked out as had the enemy vessels. The musical purr of the atomic motors slithered down the scale to inaudible pitch and stopped. All was silent as a tomb; the 9B5 had gone dead as a mackerel.

"Lord! Perhaps he was right," gasped Stone, "they have paralyzed us." He groped in the darkness for the communicating door, muttered imprecations of Dan Healy ringing in his ears. What a vocabulary that Irishman had!

There came a lurch and a heavy clanking jar as they were drawn to a larger body and held fast. The enemy vessel, invisible or not, had captured them with its magnetic attractors. In a moment they'd be boarded.

THE hull of the 9B5 reverberated hollowly to the tramping of weighted metal shoes and to the sounds of mechanical connections being made to their own hermetically sealed manhole entrance. In a few minutes they'd be inside, the bestial Martians. The captain located a pocket flash lamp and, by its light, assembled the crew in the bunk room. Masters was missing. Fainted again probably. He decided to let him shift for himself.

Dan Healy armed himself with two ray pistols from the rack and was dancing around pugnaciously.

"Put 'em down, Dan," he ordered. "We'll surrender."

"Surrender, sor?"

"You heard me. We're caught like rats in a trap."

"But, sor, beggin' your pardon. 'Tis well you know what thim divils do with prisoners."

"Enough. We haven't a chance if we fight. If we are taken prisoner—who can tell? We may learn something aboard this ship of theirs; may even gum their game."

Dan Healy subsided but surreptitiously thrust a ray pistol in his pocket.

And indeed, resistance was useless, for the rarefied air to which the hated Martians were accustomed would make it impossible for the Terrestrials to expend any great amount of physical energy for some time after they became subjected to it. Even now the hiss of their own air as it escaped into the larger vessel reached their ears. Soon they would feel its scarcity.

Strident voices echoed through the passageways of the 9B5 now and Captain Stone faced the door through which the boarding party must come. Already foul odors of the Martian atmosphere as duplicated in the great spherical ship to which they were attached were mingling with the thinned air within their own vessel. One of the men coughed and then cursed horribly.

There were sounds of tinkering in the control room and the engine room. One of the small generators hummed into life and the 9B5 was alight once more from its normal source.

A new sound smote their ears, a shrill moaning note that set their pulses throbbing and blurred their vision with the vibrations set up in their bodies. Another new weapon of the Martians!

Dan Healy was panting from the effort to obtain sufficient oxygen from the unaccustomed medium he was forced to breathe. It was his first experience with the rare but rank gas breathed normally by the inhabitants of the red planet and it quickly took the fight out of him. Even the captain swayed uncertainly on his feet. In the matter of a few hours they would become used to it and would get along with very little difficulty, though with a higher rate of respiration and with greatly quickened pulse.

Captain Stone experienced a new sensation, a gradual stiffening of his muscles, a creeping rigidity that told him this moaning, throbbing note that filled his vessel was the warning of a diffused paralyzing energy that would quickly render them helpless. The wily Martians were taking no chances of meeting with organized resistance. One by one he saw his men topple to the floor and lie starkly staring. He fought the energy stubbornly but without avail. Distorted bestial faces leered at him out of the thickening haze and he knew the enemy had swarmed into the room in droves.

Confused impressions came to him of flabby pawing hands that he fought off weakly and ineffectually; of semi-dark passages through which his pain-racked body seemed to float; of a babble of excited gutturals that sometimes swelled to a deafening roar, only to fade again into the dim distance and leave him with a sickening feeling that he had lost them altogether. He drifted into a state of blissful repose and quiet. If only they would leave him alone like this, to die in peace . . . if only he might slip away this way . . . from the humiliation and disgrace . . . losing his ship!

He lost consciousness.

REALIZATION that he was still in the land of the living came to him as a distinct surprise and disappointment. He was stretched comfortably on a padded couch. Opening his eyes experimentally he was forced to close them against the glare of a tremendously powerful light that shone on him from above.

New strength suffused his being under the warming rays from the great light. It seemed that the blood coursed through his veins with renewed pressure; he could feel his heart pounding at his temples. His perception quickened rapidly and once more he opened his eyes, this time to stare into the lidless green optics of a huge Martian. He sat up on the instant.

"Ha!" exclaimed his captor, using the universal language of the planets with atrocious accent, "Captain sleeps long time but now awakes. It is good."

Stone observed the decorations covering the bloated chest of his evilly leering companion. He must be an admiral, at least. "What do you mean, it's good?" he growled into those unblinking red-rimmed eyes.

"It is good!" The Martian emitted a series of cackles that were intended to indicate mirth. "You have stumbled on our secret, you and your tiny vessels, and we captured you every one. It is to laugh."

"Huh! May I ask what you intend to do with us?"

"You should know, captain. The canals of Mars and the pumping plants are sadly undermanned and all prisoners from the inner planets are welcome as laborers there. But first you shall witness our triumph, the triumph made possible by the invention of Kiros, who sits before you."

"Yourself, you mean?" Captain Stone was scornful, but his inflection was lost on the braggart Martian.

"None other."

"And this marvelous discovery of yours?"

"You learned of it—the invisibility. We now can make our ships invisible to your observers—all of them. We shall go through your defense lines unseen and finish the war before your people know what has happened."

"Yeah? And I suppose this curved beam of yours is the first step in the new method of warfare."

"Bah! It is but a gesture, captain. A discovery of one Zin, an obscure scientist. It is effective, as you well know, but the cost is enormous. The real work

will be done by the cruisers—with the invisibility. You shall see." The Martian officer had risen to his full height and was pacing the floor in excitement.

Stone watched him narrowly. Insufferable egotism, the mark of the Martian since time immemorial, radiated from the ungainly Kiros. He had difficulty in restraining his merriment at the sight presented by his captor as he strutted about—the great head and enormous chest surmounting spindly legs that seemed incapable of supporting more than a small fraction of the weight of the upper body. But he remembered the Martian gravity; his own sensations told him of the slight intensity of the energy in the floorplates of this vessel. He'd have to get used to it—have to be careful in a gravity field only a third of the strength to which he was accustomed.

"When does your little party begin?" he asked.

"Very soon. Even now our entire fleet is being equipped with the invisibility feature. Then comes the great day, and though we are outnumbered nearly ten to one by your fleets, we shall win. Yes, we shall win without losing a vessel of our own number."

"Meanwhile what is to become of me and of my men?"

"You, captain, will be allowed the freedom of the vessel within certain bounds. This is granted on account of your rank and because we expect to learn many helpful things from you. Your men are incarcerated in the hold of the vessel and will so remain until we return victorious to our own planet."

"Thanks." The ferocious glare that shot from under the bushy eyebrows of "Rocks" would have caused any enlisted man in the Fifty-first to quake in his boots. "You expect to get information from me regarding the plans and armament of the Allies, information that will be to your advantage in the campaign you have projected?"

"Of a certainty. We have many ways." The toothless gums of the Martian were revealed in a nasty grin.

"Like hell you will!"

The captain bounded half way across the room and swung a mighty right toward Kiros' jaw. But he overshot the mark badly; he'd forgotten to figure on the Martian gravity. Quick as a flash a ray pistol appeared in the hand of his captor. With its spiteful crack came the dread numbing sensation in his right shoulder. The energy that paralyzes! His arm hung limp and useless and would remain so for many hours before returning to normal in an excruciating agony of revitalization.

Kiros cackled venomously and strode from the room.

IT was evident that the narrow room in which the captain had awakened was intended as his sleeping room for some time to come. There was a long cot and a table, two chairs and the curious stand-lamp which had been used to bring him to consciousness. Otherwise the room was bare and unadorned, a cell. He tried the door through which Kiros had left and found it opened freely. A furtive peep down the corridor revealed a Martian guard on watch, a big-eared malicious looking fellow who was armed to the teeth. He withdrew his head from the opening and closed the door softly.

Yeah! Freedom of the ship . . . within certain bounds was right. He slumped into one of the chairs and fell to musing. The throb of the cruiser's motors came faintly to his ears and he wondered whether they were bound anywhere or were merely maintaining their position in space with relation to the planet Venus. You never knew unless you could compare the position indicators with the cross lines of the master chart.

He thought of Masters; wondered whether they had gotten him or whether he passed out completely in that last swoon of his. Funny, the rookie had been right at that, both about the invisibility thing and about the curved beam being used in the destruction of Seritanis. If only he wasn't such a white-livered devil. Imagine one of his own roughnecks fainting at sight of an enemy ship! Why, Dan Healy would fight at the drop of a hat even if the odds against him were a million to one. He grinned at thought of what Dan must have done when he came to his senses in the hold of the cruiser. Probably would get himself bumped off by tearing into a half dozen guards at the first chance he got.

Why hadn't he listened to Dan in the first place? They could have given a good account of themselves with the ray pistols when the 9B5 was boarded. Suicide, of course, but then wasn't honorable death preferable to this? Still—something might happen yet.

His arm was beginning to ache and he stretched himself on the cot, which had been built for the body of a seven-foot Martian. A feeling of homesickness came to him. He hadn't been home in three years. Rotten war, this was, and Lord only knew when it'd be over now. This curved beam attack on Seritanis—funny Masters got wise to that so quickly—was demoralizing, of course, and would go a long way toward breaking down the spirit of the Allies. No doubt they could move the generator of the thing anywhere they pleased and destroy one city after another—if the Martian resources held out. Must consume a whale of a lot of energy. But the invisible battleships were another thing again. Why, they could just slip in through the lines and lay waste all the great cities of both planets, the defenses being entirely useless against an enemy who could not be seen. Even the direction finders, sensitive as they were, would be of no avail. You couldn't direct a ray at a moving object that was invisible to the eye, no matter how good a line you had on it with the direction finders. There was too much time lag to be taken into account between the obtaining of the finder indication and the release of the ray. You had to *see* them to hit them. What a problem for the Allies! First and most important problem, though, was to get out of this mess and get word to headquarters, if there was any chance in the universe of doing it . . . looked like a tough job . . . still . . .

Captain Stone fell asleep.

HE wasn't sure at first whether he was awakened by a low voice he thought had whispered in his ear or whether it was by the agonizing torture that now racked his right arm and shoulder. The lights were out and the darkness was so thick it stifled him. The soft purr of the ship's motors was the only sound. He lay very still and listened.

"Captain!" He knew he had heard a voice now.

"Who is it?" he whispered cautiously, fully awake at last and with every sense alert.

"Dan Healy, sor. Are you all right?"

"Yes." He blessed the loyal Irishman fervently and quickly slipped to his feet. "What's up, Dan?"

"The divil's to pay, sor, if you don't hurry. We've escaped from below, the intire blissid crew of the 9B5. Burned sivin of the guards to cinders with the flame pistils Masters brought. In a jiffy, sor, they'll be after findin' us out. Can you make it to the intrance manhole?"

"Sure. Come on," the captain whispered hoarsely, "but how in the name of the imps did you do it? Masters again! How did it happen that whippersnapper always had a hand in things?

"Niver mind now, sor. You'll find out later."

Marveling at what he had heard, Stone followed the Irishman into the corridor. He saw the crumpled body of the guard who had been stationed at his door. Dan

scurried along the passageway and he followed unquestioningly. Into a side passage they ducked and down a ladder well into the dark regions between decks. Healy had him by the hand now—his good hand—and was dragging him unceremoniously through a narrow space between a steel bulkhead and the curved hull plates of the vessel. Feeling was returning to his right arm but every movement of the slowly releasing muscles brought exquisite torture.

"Quiet now, sor," Dan warned, "we're near the manhole."

Then they were through, inside the air lock of the 9B5. Two of his own men were there, armed with disintegrators, and they welcomed him enthusiastically.

"Is iverybody in?" Dan asked.

"Naw. Masters is still fooling around inside the big ship. Said not to wait for him if he was gone from here more than twenty minutes," one of the two watchers replied anxiously.

"Masters!" Dan Healy stole a glance at the grim face of his superior.

Captain Stone took in the situation at once, though still confused by the sudden turn of affairs. Masters again! Would that damned rookie always be a pest?

"What's he doing inside, Anderson?" he asked.

"Said there was something he had to learn about the workings of the big ship, sir."

"He would do a fool thing like that."

Dan Healy eyed the captain curiously. "He's a great bye, sor," he said. "Wasn't for him, we'd all be——"

But the sentence was never finished for, at that moment, there came a shout from within the huge globe to which the 9B5 was attached. Sounds of fighting reached their ears; the bestial scream of a mortally wounded Martian. Masters bounded into the circle of light by the manhole connection, sending streamer after blinding streamer into the darkness from his flame pistol. By its light they saw that he was battling a dozen of the ugly creatures that were the highest form of life on the planet Mars.

Marveling at the sight of the rookie battling like a veteran the captain dragged him inside and swung the manhole cover home. Inside the air lock, young Masters collapsed. His hair was burned from his head and his face was blackened and blistered.

"Quick!" the captain bellowed. "Every man on duty! We'll pull away." He rushed to the control room, noting first that Masters had staggered to his feet. Perhaps there was something to this rookie, after all.

"Can we do it, sor?" Dan asked him, when they were at their accustomed posts once more and the 9B5 was throbbing to the energy of her atomic motors.

"Sure. It's a slip joint they used to connect us—one of those rubber gasketed things, you know, and with only two anchor bolts. Give her hell!"

The little vessel creaked as the repulsion energy was thrown full on. Dan rocked her back and forth to break the anchor bolts. Then there was a lurch as she pulled free and the instruments registered a terrific velocity of escape.

Captain Stone peered into the teleview and watched the great spherical vessel as it went hurtling off into the blackness. He knew the Martians would be struggling frantically at their own air lock seals to prevent the escape of their rotten atmosphere. Nothing invisible about that ship now. But, by Jupiter, it had been invisible when they were captured! He scratched his head in perplexity.

"Say, Dan," he blurted out, "tell me what happened." He had forgotten his aching arm in the excitement and now found that the pain was mostly gone and that he could move his fingers freely without having to grit his teeth in agony.

"Plinty, sor. This crazy Masters busted in on us where we was locked up and he had more ray pistils in his two hands than you iver saw a man carry. Killed four of the sivin guards hisself. They was craymayted before they knew what was happenin'. He said whin the Martians searched our ship he rolled under a table and they missed him intirely. Thin he took command of the situation like a old-timer. Sint me to look fer you and wint huntin' hisself for somethin' he said he was wantin' to find out about the big ship. The rist you know, sor."

The captain stared incredulously. It sounded too much like a fairy tale. Imagine that rookie pulling a stunt like this!

"What do you know about that!" he exclaimed. Looked like he'd misjudged this rookie after all. He turned to the microphone. "Masters!" he called.

There was no reply. His kindly feeling toward the rookie evaporated. Now what was wrong with the bird? Once more he dashed through the communicating door.

Masters was not in the room of the beam apparatus, not even on the floor where he had fully expected to find him stretched. But two heavy cables had been connected to his high frequency generator and these were strung along the floor and led toward the engine room below. Experimenting without permission! Stone followed the cables, his mind a riot of conflicting emotions—unwilling admiration for the rookie, even though he did swoon on the least provocation—dark threats of court-martial for his action in fooling with the mechanisms of the ship.

He found the ray operator and his chief engineer engaged in making some electrical connections to the junction box of the gravity system, where the supply buses branched off to carry the propelling energy to the hull plates of the vessel.

"What goes on here?" he snapped.

Masters straightened up from his task and his eyes shone with excitement. "I think I've learned the secret of their invisibility, sir," he said, "and we're all set right now to try the same thing on the 9B5."

"Yeah? What do you think this ship is, a laboratory? You get back on the job now and forget all this monkey business. Our late hosts are just liable to take it into their heads to come back for another attack on us."

"Exactly what I was thinking, sir, and we'll be ready for them if they do come."

Masters dashed for the companionway without further explanation. Growling, the captain followed him to the projector room where he plugged in on the duplicate controls.

A glance at the teleview showed him he had guessed correctly about Kiros. The great Martian cruiser was returning to the attack, visible as yet and coming in fast.

"Ready with your forward rays, Masters?" he snapped.

"Yes, sir. Are they coming in?"

"They are. I'll give you the settings in a moment."

But just then the enemy vessel vanished as it had done in the first attack. Snuffed out, like a candle. The teleview was useless. Captain Stone swore picturesquely.

"Pick them up on one of the direction finders, sir," Masters suggested.

"Too slow. We'll never get them that way." The captain's voice was hopeless.

"I can't agree with you, sir." Masters was connecting a black box to one of the finders, a small mechanism that was provided with two eyepieces like those of a binocular.

"Look into these, sir," he begged.

MAGICALLY the enemy ship appeared in a cross-hatched field like that of the master screen. True, its outline was faint and of a pale violet hue, but it was there and he could direct the fire of the ray projectors with speed and accuracy. No waiting for calculations here. By some clever means Masters had solved the important problem.

Excitedly now, the captain was calling orders into the microphone. The ship swung around as Dan executed them. Now he was calling numbers to Masters, noting from the corner of his eye that the amazing recruit was at the projector controls.

A streaking pencil of violet light shot forth from one of the turrets of the enemy vessel. A miss! Twin pencils of the same disintegrating energy issued from the projectors of the 9B5. The range was too great.

Stone had not noticed before but now realized suddenly that it was growing very cold in the little scout vessel. His fingers were stiffening as he twirled the knobs of the direction finder. But the enemy ship was slowing down now, moving uncertainly, its streaking d-rays searching the skies for them in all directions but the right one. He watched in amazement.

Masters had deserted his post, was at his side stealing a glance through another of the magic black boxes which was attached to the second direction finder. "It works, Captain, it works!" he exulted. Then he executed a war dance on the floor plates.

"What works, you fool?"

"We're invisible, that's what. Notice the cold? Notice they can't locate us. We're invisible, I tell you!"

It must be that Masters spoke the truth. By some chance he had stumbled on this secret of the Martians. The enemy vessel now was searching frantically for its tiny antagonist, using every beam of its five turrets. Then abruptly it turned tail.

"Back to the projectors, you nut!" Captain Stone shouted now at Masters, now into the microphone. The 9B5 was tearing after the fleeing globe of the Martians. Gaining, too.

Soon they were within range and the twin rays poured into the great sphere's vitals. Gaping openings appeared in the hull where the vicious energy let loose its terrific destructive power. One of the turrets was blasted completely out of existence. Another! The cruiser wabbled uncertainly and started spinning from the force of the terrible energies that were tearing her to shreds. Then she collapsed into a lop-sided, shapeless mass and swung around on a new uncontrolled course. Her motors had stopped; her crew must now be victims of the cold and vacuum of outer space, for all of her filthy atmosphere had escaped from within. She went reeling off into the heavens, fated to be perpetually a new satellite of Venus.

The captain looked up from the finder. Black specks floated before his eyes. He saw that the sphere was once more visible in the teleview. Its power plant wrecked, the twisted metal of its hull was again visible to the eye. He laughed, a little crazily, he thought.

Masters was again at the second direction finder, his eyes glued to its little black box.

"Now, you son-of-a-gun," said the captain. "Tell me about all this. What's the answer?"

"Simple as A B C," the rookie grunted. He was twirling the controls of his apparatus. "I sneaked into the engine room of the Martian ship. Had a hunch about the invisibility thing, anyway, and there I saw they had some trick connections that solved the whole thing. You know the hulls of their vessels are plated with graviloy, the same as ours."

"Yes, I know. But where does that get you?"

"Captain, it's a cinch, I tell you. Gravity is controlled by setting up atomic vibrations in the graviloy plating. Its atoms are forced to take on a wave motion that is imparted to the surrounding ether and sets up the artificial gravity field that propels our vessels. Making the ship invisible is the same thing, excepting a different frequency and wave form is required. We merely set the atoms of the hull plating material in motion at such a rate that the material will reflect no color whatsoever with the exception of the ultra-violet and that, of course, is invisible to the eye. But it's not invisible when viewed through my little black box."

Masters paused as he made some further adjustments of the direction finder controls.

"And the cold?"

"Oh, yes. You see there is a direct relation between vibration frequency and temperature. On the other end of the scale—the infra-red, you know—there is intense heat. That's what the infra-red ray is, a heat ray. With the frequencies I'm using to get the invisibility there is produced an intense cold, or rather the heat is permitted to radiate freely from our vessel out into space. Get it, Captain?"

"Er—yes. And the little black box; what's in it, Masters?"

"Oh, that's an idea of my own. Developed in the War College. Works on the principle of the photo-electric cell. Makes the ultra-violet visible. That's how I got the line on the curved beam at first and, Captain, I think I have it again right now."

Stone was dumfounded. This youngster certainly had a bag of tricks; took it all as a matter of routine, too. "Say, kid," he enthused, "do you know you've saved the inner planets from destruction? Know we can lick 'em to a frazzle now, having this information of yours? The Martians, I mean. Know you'll be the——"

"Wait, sir! Here, I want you to have a look. We'll be able to do what we started out to do. Watch!"

He had pulled the captain to the eyepieces of the finder and relinquished his place. There, against the jewelled blackness of the heavens, a great arc of violet light was weaving. A slender, curved pencil that originated out there in the void and ended at the brilliant surface of the enormous globe that was Venus. The relentless swinging of the bowed beam fascinated him. He watched it in silent awe.

"See it, sir?" Masters asked.

He roused himself with a start. There was some sort of hypnotic influence to the accursed thing; something that gripped you and got you in its power before you were aware of it. "Sure, I see it," he said slowly. "This is a marvelous thing you've done, Masters."

"I didn't think of the ultra-violet rectifier at first. The first line I got on the beam was by straight readings of magnetic ray reflections. Then I realized it was the frequency of the thing that made it entirely invisible and that I could bring it into view with my rectifier. And there you are."

"Say!" The captain jumped to his feet and plugged in the microphone once more. "We can follow the dam' thing to its source now. Find out what sort of a machine is sending out this destruction and wipe it out of existence."

"Yes, sir. I believe we can."

STONE was snapping orders to Dan Healy now. The ship swung around and bored into the heavens toward the point from whence originated the mysterious ray that was destroying Seritanis. His eyes were glued to the attachment Masters had developed for the direction finder.

"Be ready at the projectors, Masters," he ordered. "We'll be within range in a very few minutes. I can make out the source of the thing now."

"Yes, sir." Masters had glanced into the teleview, where nothing was visible, and now jumped for the projector controls.

The captain glued his eyes to the little black box. A great nebulous disc appeared at the outer end of the curved beam, a disc of faint purple hue. The color told him it was as invisible to the naked eye as was the ray itself. They were rushing toward the monster engine of destruction with terrific velocity.

"Distance, Dan?" he called.

"Ninety-two thousand from Venus, sor," the loud speaker boomed.

"Reduce to cruising speed."

"Yis, sor. Ninety-sivin thousand miles now, sor."

"All right. Full repulsion now, Dan."

The 9B5 shuddered as the energy reversed. Masters tightened his fingers on the ray controls.

Stone called sighting numbers rapidly. The monstrous disc loomed very close, a menacing shape from which the terrible curved beam continued to stream.

"Let 'em have it, Masters!"

He saw the twin rays spatter against the side of the queer space ship as Masters pressed the releases. This flattened machine of the Martians must be a mile in diameter—an eighth of that in thickness. Must have expended a lot of their resources on that thing! No wonder Kiros had squawked about it. And to keep it invisible! The expenditure of power must be tremendous. He saw sections of the hull melt away in the characteristic puffs of vapor; saw the curved beam cease abruptly as Masters continued pouring in the deadly energy of the d-rays. The disc was altering its shape and color. Masters must have hit a vital spot. Now it would be visible in the teleview. Things were becoming hazy. He raised his eyes from the little black box. Black specks floated and danced before them. He looked at Masters and saw him as through a swirling mist. Then there seemed to be three of him; three grotesque replicas of the young ray operator. He clutched at the finder pedestal for support; slipped to the floor. Jupiter, those floor plates were cold!

His senses deserted him.

When the captain opened his eyes this time he half expected to meet the baleful glare of Kiros, the Martian commander. Instead, he beheld the smiling features of Dan Healy.

"What—what happened?" he gasped.

"You fainted, sor," said Dan, looking slyly at him.

"The hell I did!" Captain Stone sat up suddenly and gazed about him. He'd lain by the pedestal of the direction finder and there was Masters, over there, grinning like a Cheshire cat. He jumped to his feet and squared his shoulders resolutely.

"Are you all right, sir?" Masters inquired.

"Sure. But how about this big, flat Martian ship?"

"It's done for, Captain. Whirled off into space like the big sphere. There'll be no more destruction here."

"Good. Good. That's fine." Stone stared uncertainly from one to the other. Then he became a whirlwind of energy. Dan followed him into the control room.

In a moment he had started the motor-generator of the etherphone. Headquarters must be notified at once. This was the biggest news of the war! Matter of fact the war was over, if they only knew it, and it was up to him to start the ball rolling—get the story across to the allied forces. He was calling Bulldog Carlson.

"Get Masters in here, Dan," he said, between calls.

Before the C. O answered, Masters stood before him.

"Say, kid," he growled, "what are you doing out there in the projector room, all by yourself?"

The rookie's eyes lighted. "Experimenting, sir. I thought you wouldn't mind—now."

The captain stared. This boy sure was a glutton for punishment! Couldn't even let up after he'd won the war for them. "Experimenting?" he asked weakly. "What in the name of the imps with, this time?"

"This extreme frequency of atomic vibration, sir. The reduction of internal temperature in the vessel when we are invisible. There must be some way of overcoming that disadvantage as the Martians undoubtedly accomplished it in the big, flat vessel."

"Yes. Yes. Umm." The captain was developing a healthy respect for this youngster.

The loud-speaker blared. There was a screeching note that finally stabilized and died down to a whisper. Bulldog Carlson's voice came through clearly then and the captain started talking.

"Shut up, will you?" Carlson eventually roared. And Stone was silenced. "We knew the ray generator was destroyed, Stoney. Hell, the Martians are suing for peace right now! They found out that one of our vessels had discovered all their secrets and we've been breaking our necks trying to learn which one it was. Knew all about it before you called, but didn't suspect you were the one who had done the dirty work. You old wisenheimer! How the devil did you do it, tell us all about it."

"I didn't. Just a minute—I'll let you talk with the man who is responsible for it all."

He forced the microphone on Masters. Dan grinned.

Masters found his voice after a while; told the story modestly but accurately. When he had finished there came a roar from the loud speaker that rattled Dan Healy's instruments on their board. A roar as of a million voices it was and the ray operator growled his resentment when he realized that the populations of two planets had been cut in on his recital.

The captain was at the microphone once more, talking rapidly to the C. O. Things were moving fast back there in Venus and on Earth. The Martians, thoroughly cowed by the unexpected turn of events, had surrendered unconditionally. Even now the Allies were formulating the terms. A fleet of war vessels, carrying the army of occupation, was on its way to the red planet. All enemy fleets were to be turned over to the Allies; all prisoners to be returned. Reparations in payments of radium and other precious metals would be enormous. The Martians knew when they were licked and were saving their skins at the cost of most of their resources. Many a generation would pass before they could again become a menace to the inner planets.

Reports received at Thrygis by heliograph advised that the 9C8 and 9F1 already had been released by their captors with all men of their crews accounted for and on board. The 9B5 was ordered to her base at once and the captain and Masters were to report to the Home Office at the earliest possible time. Decorations awaited them there, and promotion.

A LITTLE later, back in the C. O.'s office, the captain was writing his official report. Young Masters and Bulldog Carlson were conversing in low tones by the window.

"Say, Victor," the captain called, and somehow the name didn't seem so silly to him now, "what rays did you say those were that knocked you out at the direction finders?"

"Just call them stray harmonics, Captain; I didn't analyze them completely. And, if you remember to say anything about yourself in that report, you were knocked flat by the same thing, you know."

Rocks glowered at the smiling ray operator. Then he sat back in his chair and guffawed noisily. "Aw, hell," he said, "I'm going to tell 'em I fainted. I still believe I did."

The C. O. grinned his appreciation.

THE END

Extra-Galactic Invaders

By J. Schlossel

Author of "The Second Swarm"

EXCEPT that we have finally hearkened to the clamorous demands for an all-interplanetary quarterly, it would have been impossible for us to include this classic novelette by the author of "The Second Swarm." We predict that, popular as that first story was, it will be as nothing compared to the amount of enthusiasm which will be voiced, in the form of letters to us, after "Extra-Galactic Invaders" is read.

We think, in fact, that this story will be reread many times.

IN the black depths of space between island universes, eyes, sharp and unblinking, kept watch. There in the midst of that intense blackness, relieved only by distant patches of hazy light emanating from far-off galaxies, some brighter and nearer than others, sentient beings strained their vision toward two nebulous patches that were brighter than all except a huge spiral nebula that lay sprawling over a vast area behind them.

To those watchers, the two brighter patches, tiny island universes, nearer than any of the myriad galaxies which faintly spotted the surrounding blackness with their nebulous light, spelled danger.

Between the watchers and the nearer of those two tiny island universes were numerous jagged fragments of what had once been a mighty star, long grown cold and disrupted by some terrific cataclysm. Those fragments, following curious and complicated orbits around a common center of gravity, moved steadily toward that hazy patch of light.

At the tip of the smaller and nearer of those two island universes was a small stationary black spot, a dense, globular cluster of dead and burnt-out stars, that was visible only because it blotted out the light from living stars behind it. Powerful though their space-penetrating instruments were, they were not powerful enough to dissolve even the outermost fringe of that blackened cluster.

The eyes of the watchers in the path of that light grew chilled with dread as they tried to withdraw. They recognized the light as a form of disintegration vibrations; could produce it themselves. Disrupting molecular equilibrium, no known form of matter could withstand those destructive vibrations. Everything they touched, their power of penetration in the denser elements was on an average of some five thousand feet per second, was broken down to its original atoms.

BITTERLY did 4-P-2269-L, Lunarian, member of the so-called inferior race, which from time immemorial had, until the coming of man, dwelt in the world-deep clefts and vast caverns that honeycombed Luna as free and civilized beings, now a subject race, turn from his human companion who spoke glowingly of what vast strides mankind had made; especially did he harp on the latest of man's undertakings, an expedition of exploration beyond the bounds of the Solar System in which they both were to participate.

"Come, Lune," the man said with a slow smile, addressing his companion as he was wont by that half affectionate diminutive instead of his cold official number, "cheer up."

The Lunarian glared at him. Hate struggled for birth in that gaze. Quickly he turned his head away in an effort to keep that sudden dislike from showing in his eyes. The being from Luna and the man from Earth were the closest of friends. Having been taken from his own kind at birth and assigned to the care of his two-legged companion's parents to be brought up in the ways of man, that particular human being, Don Stelite, was the only one of the whole human race, the Lunarian could conceive the slightest affection for.

"What has come over you of late?" the man asked. "Everything I say seems to irritate you."

A fragment of matter between the approaching light and the watching eyes, a mighty fragment of that dead star, planetary in size, was caught within its glare.

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MOREY

"Why shouldn't it?" the Lunarian demanded angrily. "You speak always of the glories and achievements of the human race, but what of my race? We are not brainless beasts."

"I am sorry."

"You, a member of your accursed race, sorry!"

"You are not taking the right viewpoint, my Lunarian friend."

"Not taking the right viewpoint?" the Lunarian repeated incredulously. "You two-legged savages conquered my peaceful old race with your strange and deadly weapons, degraded us to the rank of slavery in your barbaric civilization, treated us at first as you used to treat your patient four-footed beasts of burden, and now you expect us to rejoice because your restless species are about to add to their glory by extending their domain still further!"

"Do not take it that way, Lune. Though my ancestors conquered yours and treated them rather badly, we of this later and more advanced date are trying to make amends. Your race now has every advantage we human beings have."

"Equality?"

"N-no, that is, not yet."

"Never!"

"Don't be so bitter. There has been talk of giving you Lunarians full and equal citizenship in our civilization."

"Talk, nothing but talk," the Lunarian was scornful.

"Also," Don Stelite continued, "the withdrawal of all human beings from the subterranean cities of Luna and the right of your species to rule your world again."

"Man has been promising us for centuries that they would give us back our ancient world. Not being a warlike race, we have waited patiently for that promise to be fulfilled. Lately we have come to realize that, unless we wrest it from your race by force, never will we be rulers of Luna again."

The Lunarian, fearing that he had said too much, determined to say not another word, at least not until they reached their destination, the nearby opening in the wall that surrounded the local space ship pits. Another five minutes' walk and they would be there.

"Amongst your own race, Lune," Don Stelite asked after a few moments' awkward silence, "you are some kind of a hereditary chief?"

"Were my house still ruling," the Lunarian said quietly, "Overlord of the Elder City, now only an interstellar pilot for my human masters."

"But your race still regards you as one of their hereditary rulers?"

The Lunarian nodded grimly. Man had tried to keep his identity from him, but members of his own race had sought him out in secret and taught him the history of his race and lineage.

"In the past, before the coming of man, the lesser cities usually followed the course chosen by the Elder City?"

Again the Lunarian nodded.

"Amongst the chiefs of the Elder City your word still carries weight?"

The Lunarian gazed at his human friend sharply.

"There is a rumor that the Chiefs of the Elder City," Don Stelite hurried on, "are plotting to regain Luna by force."

The eyes of the Lunarian darted about for an instant like those of a trapped animal. He half turned to flee.

"There is also a rumor," the man kept on grimly, "that the inhabitants of some of the hidden cities in the deepest caverns of Luna are manufacturing the latest weapons of interplanetary warfare in large quantities."

The Lunarian said not a word.

"We have been together all our lives, Lune."

"What of it?"

"I know that you have been secretly meeting your—"

One of the Lunarian's hand-like appendages darted to a prohibited death-dealing tube concealed beneath the voluminous folds of his cloak.

Don Stelite shook his head sadly.

"I would do anything to make my race free again!" the Lunarian cried passionately.

"You have forgotten the Two."

The hand-like appendage dropped limply away from the hidden lethal tube. He had indeed forgotten the Two, the two through whom mankind in their strange way were beginning to rule themselves.

"Are the Two," the voice was that of one who had given up all hope, "about to order me to destroy myself?"

"No."

"I do not understand."

"This is a warning."

"Since when have the Two begun to warn?"

"The Two, my Lunarian friend, never warn."

"I still do not understand, Don."

"I am warning you. You have been wronged enough. My race has done things to yours that we human beings of today can recall only with shame. We are trying to right that wrong. You must believe that."

"How can I? With all the advantages you say we have, we from Luna are still nothing but slaves. Because my rather large eyes are sensitive to the weakest light waves, also susceptible to infra-red and ultra-violet radiation, making me valuable as an auxiliary to the automatic electro-magnetic piloting devices aboard your interstellar craft, I am ordered to join the forthcoming exploration expedition to Alpha Centauri, which tonight is leaving the Solar System."

"I, too, must go where I am ordered."

"It is your race. You are to command one of the ships."

DON STELITE'S form stiffened suddenly. His lips moved, but no sound issued forth. The Lunarian, who had witnessed those attacks countless times, knew that his friend was in telepathic communication with another member of his race. His form relaxed and he turned to the Lunarian.

"Lune, a new device somewhat similar to a radio transmitter, but on a different principle and infinitely faster, has been completed and I have been ordered to see it tested. Make no overt move while I am gone; you are being watched."

The Lunarian thought of the warning as he made his way to the ship he had been assigned to. He had delayed a day too long. Another twenty-four hours and he had planned to leave Earth. A tiny ship hidden near his quarters was ready to carry him deep into the bowels of his ancient world. Once there he believed that he would be safe even from the Two.

The noise and excitement that usually attend the departure of a fleet of interstellar ships drove every thought from the Lunarian's head. Hardly had he taken his place in the pilot room of the Alpha Centauri when orders came to stay the expedition.

Through a roundabout source he learned that a message was being received from out of the depths of space on a new receiver that human scientists had perfected. Thinking that he would not have long to wait before the command to proceed was given, he elected to stay at his post by the forward telescopic observation window. Had he waited for the command an eternity would have passed, for never was the command to be given.

Man, at the time the signals were first detected, had long been familiar with electro-magnetic phenomenon,

which included radio-telephony, television, wireless transmission of energy, and even the transportation of matter by directed radio waves. But to him, impatient as ever, even the speed of light at which the radio waves traveled was becoming too slow. He had been experimenting with the possibility of utilizing the almost instantaneous speed of gravitation for the purposes of communication between the far scattered points of the Solar System when the signals were first detected upon the crude experimental apparatus.

At the beginning of the 37th century mankind, with the faculty of thought-transference—telepathy which he had acquired two centuries previously, and the ability of mass-focusing of thought waves upon certain trained individuals, especially the Two, was radically different from his semi-civilized forebears of the 20th century.

The Lunarians had also changed much. From an inoffensive form of intelligent life which had for long eons of time remained at practically a mental standstill, they had become a race of desperate creatures determined to risk even annihilation for freedom.

Fast upon the detection of those signals, they had automatically been recorded, followed by their interpretation. Man could hardly credit the unfolding message, only the fact that it had come from a point in space far beyond the limits of the Solar System in the direction of blue-white Achernar which lay between the constellations of Tucan and Dorado stamped it with some degree of authenticity, while its urgency required it to be given immediate attention.

Beings of extra-Solarian origin, claiming to represent a confederation of solar systems, had sent out into the wide expanse of our island universe the call to arms. They were being subjected to a continual onslaught from a demoniacal form of life who were on an invading expedition from two small neighboring island universes. In the constellations of Tucan and Dorado were the Magellanic Clouds, the nearest of all island universes surrounding our own.

Until recently the forces of the Confederation had managed to hold them off from their own uninhabited worlds, but now they were coming in uncountable numbers. Every form of reasoning life inhabiting the myriad worlds of our island universe was doomed unless the invaders were repelled, destroyed.

On the outskirts of our island universe facing the Magellanic Clouds there were a number of solar systems whose inhabitants had long been banded together for mutual protection and advancement. Like a gigantic shield did those solar systems at the edge of our galaxy stand between the Magellanic Clouds, two tiny island universes almost touching our own, and the countless solar systems behind. Only the formation of that Confederation saved our own galaxy from falling easy prey to our warlike neighbors.

The ancient civilization of the Confederation, as well as every other civilization in our huge galaxy was fated to be wiped out of existence if a means of checking the advancement of the invaders was not found.

Tired, war-worn, about to succumb to the unequal struggle, were the races of the Confederation, unless new and more warlike allies came to their assistance. Only a galaxy presenting an united front could successfully withstand them. A message bearing the call to arms and other information was impinged upon gravitational lines of force and broadcast instantly to the utmost limits of our galaxy.

Mankind debated upon the question—the Lunarians were not permitted to voice their opinions, though if danger threatened they would probably be the first to be sent forward to meet the brunt of the attack—and decided to investigate further. It was understood that the mechanism referred to would be somewhat similar to the matter-transmitting apparatus that man used to transport everything except living creatures.

The crude experimental apparatus upon which the message was first received was strengthened and word sent by it that mankind wished further information on the danger said to threaten our island universe. Those sound vibrations, impinged upon gravitational lines of force, bridged the gap between the transmitter on one side of the universe and the receiver on the other side almost instantly.

A few brief hours passed and then back began coming instructions for the building of a matter-transmitting apparatus. From the parts that man already had on hand, parts belonging to the mechanism he used for the wireless transportation of matter, he quickly constructed the complicated apparatus.

The combination receiver and transmitter was completed. Still mankind delayed putting its intricate mechanism in motion. It might be a ruse for hostile beings to gain a footing upon man's domain. A warning instinct counseled caution. Fearing treachery, man prepared to repulse and destroy whatever emerged from that interstellar transmitting apparatus if his suspicions were in the least justified.

No chances were to be taken. The apparatus first of all was housed in a thick globular shell of metal with but one opening and suspended in a powerful field of force that held it immovable a few feet above the ground.

Man then ringed that sphere with rows of his most destructive ordnance, the least of which would blast the metal globe and all it contained instantly out of existence, while high in the air hung ships ready to drop atomic bombs that would make of the region a raging inferno.

Metal robots, not human beings, manned each and every weapon, also the ships that hung poised high above the sphere.

THERE was yet another means of defense that could also be used as a weapon of offense, a far more dread means such as mankind had never needed to call upon before. It was the will, the human will. Singly the human will was a trifling force, but when one million human beings abandoned every mental activity to will with the full force of their minds to achieve a certain end—will that a specially trained individual should act in the nature of a reservoir to the incoming thought waves and have the power to release the flood at an appropriate moment—it was a powerful force that transcended the laws of gravitation and all electric and electro-magnetic phenomenon; when more than ten billion mature human beings united their will-power and concentrated it upon two specially bred human beings, it became an incredible force—the most powerful force the human species ever possessed.

Soon would the mechanism within the metal globe be put in motion. From high above two swift ships swooped downward through the air. The ships landed near the metal globe, resting upon the ground only long enough to discharge their passengers, two lightly clad human beings of slender build with high and bulging foreheads, and were off. The two human beings—they were the Two—moved swiftly toward the globe. From them there radiated a terrific flow of power.

Their coming was a signal. The mechanism within the sphere began to hum. For a while it hummed smoothly, then suddenly the tone changed to a shrill whine.

Moments passed, tense moments. The shrill whine had died down as abruptly as it had arisen. At the opening of the globe there was a blur. Something seemed to move sluggishly within. The Two, the only human beings in that wide region, sped more swiftly toward the opening. A peculiar radiance now began to flow from them. The radiance split into many darting streamers that swirled about them.

Darker grew the opening in the globe. An indistinct form filled it, emerged. Mankind, seeing through the eyes of the Two toward which it was focusing its massed will, recoiled in horror at the sight of the thing which had slowly emerged, and the thing itself could be seen to half draw back as if in repugnance or fear at the sight of the two slim biped beings that faced it.

Angry streamers darted from the Two toward the being at the globe's opening. Those streamers, power incarnate, were met in mid-distance by a soft glow that swept from that alien being straight for the Two.

During the past eighteen centuries the human race had changed much. Long ago, with the disappearance of all political frontiers at the creation of a world-wide state, his various racial differences swiftly merged. His domain widened until it included all the habitable planets and larger satellites of our Solar System.

It was near the end of the 19th century that man first dreamed vaguely of reaching the nearest of all heavenly bodies, Luna. His dreams took on a more concrete form when in the year 1946 or 1947 a misguided youth, following the dreams of one who had long preceded him, secretly built for himself a vehicle in the form of a projectile—numerous were the safety appliances said to be incorporated within it—which was to receive its initial impulse from outside, and had himself shot to the moon.

He never reached Earth's satellite. His projectile was destroyed even before it had left the atmospheric ocean surrounding Earth. A few years later two more youths tried at intervals of a month or so apart. They employed the reaction motor to propel their craft—the rocket principle. Those dare-devil adventurers, carrying their motive power with them and not depending upon one single external impulse, succeeded in going beyond the farthest limits of the atmosphere, but were destroyed by meteors rushing through space at velocities many times greater than the muzzle velocity of man's greatest cannon.

In the years that followed, others, in their thousands, tried. The loss of life was terrific. To the younger generation of that period it became truly a monomania to see who would be the first to reach Earth's scarred and pitted satellite. The government tried to stop the seemingly useless waste of life, but against the wild enthusiasm of its youth it was powerless. Life was cheap and the prize proportionately great. The first to reach Luna would in more than one way have Earth literally at his feet.

Meanwhile, inventive geniuses attacked the problem from different angles. Their queer, weird vessels flashed upon one after the other and were forced down or destroyed. It was not until the middle of the 21st century that one, a hitherto unknown youth, invented an apparatus that could deflect the tiny meteors rushing through space or swerve the ship in the case of too close approach of larger ones. The mechanism would function in the case of larger meteors only if the ship was traveling above a certain minimum speed.

The first vessel to be equipped with that apparatus reached Luna, but the brave youth who piloted the craft was never to know popular acclaim. Apparently misjudging the nearness of the moon's broken surface, he crashed against a steep mountain wall, which seemed suddenly to rise in front of him as he was about to land. Though he succumbed shortly after from injuries received in the crash, hastened by the lowering of air-pressure in the doubly-sealed pilot chamber, numerous were the cracks in the walls through which the air escaped, he was able to send back by means of his radio transmitter the success of the invention and other valuable information. With the aid of that newly invented apparatus another followed and gained his objective and another. Soon after that a base was established upon the moon.

Metals, precious to the human race at the time, were found upon the moon. Like a living flood did ancient man pour from Earth to its satellite. He built huge covered cities there, manufacturing from the minerals of Luna his requirements, water and air included. Food he had to bring from Earth. Not yet had he met with much success in producing synthetic foods containing the correct proportion of the then still elusive vitamins.

In their feverish search for the metals they considered precious, men began to explore the endless caverns and clefts that led deep into Luna's interior. In the larger caverns they came upon ruins of age-old cities. Even the most cursory glance made it obvious they had never been built or inhabited by creatures in any way resembling man.

The builders of those ancient ruins seemed to have used only two kinds of stone: a granite-like rock that was as sharp-cut as the day it left the hands of the bygone masons—some of the blocks still bearing ancient tool marks—and a friable reddish stone that crumbled on touch. Amongst the ruins were found numerous spike-like bars of a heavy white metal. The metal, on analysis, proved to be a natural platinum-palladium alloy. Those two metals were two of the heavier elements that those early explorers would have almost dared the flames of the sun itself to obtain.

RAPIDLY did new bands of explorers push downward. Faint traces of nitrogen and oxygen—air—had been found in the caverns and clefts near the surface of the moon. It became denser as the men went deeper. The men, wearing heavy pressure-suits equipped with compact oxygen-purifying apparatus that made it possible for them to go about even in the complete vacuum of the moon's outer surface, were able to discard their bulky suits and go about in their warm underclothing.

Then vegetable life began to make its apearance upon the floors and walls of the caverns through which the human adventurers were passing. The vegetable life glowed with a faint phosphorescent light.

Down and down did succeeding bands of explorers go, each group staking out claims in the ruins they found. The deeper the men went the more ruined cities they discovered. They noticed that the ruins were not as ancient as those found near the surface. Soon it became aparent that the further down they penetrated the less and less ancient would the ruins become. They came at last to a city that was not in ruins, that was not deserted!

Man, under his thin veneer of civilization, was primarily a killer. Being confronted suddenly by a number of Lunarians going peacefully about their affairs, the veneer was completely torn off. The Lunarians who stumbled upon them seemed too paralyzed with fear even to flee. The very first act of those explorers from a different world was to kill.

The inhabitants of that buried city, reasoning beings, had not known warfare in all their historical times, nor had they any lethal weapons. Until the coming of man there had been no need of weapons of any kind. No

wild creatures roamed the endless caverns of their world.

Like fiends from some cold and bloodthirsty world did man first appear among those peaceful Lunarians. A handful of men armed with their terrible weapons was enough to beat the inhabitants of that city into submission.

It is best to forget the years that followed. The inhabitants of city after city were enslaved and forced to dig for the heavy white metal. Fortunate were they that those two metals were plentiful in Luna's depths. Before those precious metals became so common that they were practically worthless, hundreds of thousands of Lunarians were worked to death.

From the moon it was but a step to Venus and Mars, a step that took a heavy toll of life before the vagaries of interplanetary navigation were even partially understood. At that period, imbued with the mania for exploration, man even skirted the asteroids, the numberless fragments of a disrupted planet that once had its orbit between Mars and Jupiter, and explored the frigid moons of the outer planets to see if he could exist there.

The passing of centuries saw the surfaces of various planetary bodies of our Solar System change swiftly. He built cities everywhere, adapting each to the different local conditions. On Venus, Earth's ocean-covered neighbor, he built huge floating island cities; on Mars he roofed over the deep rifts in the surface of the smaller planet and dwelt in the valleys; on the four larger satellites of Jupiter he built numerous cities covered with air-tight domes of transparent quartz; on Titan and Iapetus, satellites of Saturn, he built similar structures; on the satellites of the three outermost planets harmful radioactive gases, seeping up through the frozen crusts of those worlds, made existence upon them for any length of time harmful to the living tissues, and man resided upon them for scientific purposes only.

So rapidly were the new cities springing up that it was difficult to keep track of them. It seemed as if man was over-reaching himself. His numbers appeared to be the only thing keeping march with his expanding frontiers. Those centuries saw an era of expansion such as mankind would probably never know again.

During that period of intense activity, while every one seemed to have caught the fever of empire-building on distant worlds, scientists and inventors brought forth a host of new things to fill the rising need. The most important of all had been the apparatus that enable matter to be disintegrated and transported between the planets by means of directed radio waves. The theory, of course, had been known for centuries. Matter itself was nothing but vibrations. Many had constructed transmitters that would break matter down and send it out into space on radio waves, some had even succeeded in building receivers that would reconstruct the two simplest elements, hydrogen and helium; yet no one until then had successfully designed a receiver that would reconstruct all elements exactly in the form they were sent. Life was the only thing the matter-transmitting apparatus failed to transmit. Man hoped to overcome that failure.

Then, during the century before the last, came telepathy. Although television and other means of wireless communication on the surfaces of the various worlds virtually became obsolete with the newly acquired ability of individuals to transfer their thoughts, it was found, naturally, that it took a terrific amount of mental concentration to send one's thoughts from Earth to Luna, while to bridge the gap between the planets was found impossible for any except men of the mental caliber of the Two.

It was while experimenting for a more rapid means of communication between the various planetary bodies of our solar system than by radio that man first detected the signals coming from the edge of our island universe. There then followed in rapid succession the events that brought the representative of the Supreme Council of the Confederation to pass upon man's eligibility to join the Confederation of Solar Systems, and to instruct him if he was.

Never had mankind seen or even imagined life in the form of the being which moved out of the globe like a black shadow. Each human mind was momentarily steeped in the depths of utter loathing for the monstrosity that had come from the other side of the universe in the guise of a fellow reasoning form of life. Mankind saw only the alienness of its form, not the kinship of its intelligence.

The emotion that mankind entertained for it, the creature seemed to return in kind. It appeared as if man was just as repugnant to its sensibilities as it was to the human species. Its instinctive reaction also was to destroy.

The angry streamers from the Two and the soft glow from the alien monstrosity struggled a moment for mastery. Titanic forces were they.

The soft glow swept forward, smothering the darting streamers in its folds. Back recoiled the Two. Sharp clicks were heard all around and in the air above as they moved back. Metal fingers touched sensitive triggers and were beginning to press.

The streamers from the Two increased in fury and power as they drew on their reserve force, dashed against the soft glow, whipped it into feathery wisps, drove it back. Forward moved the Two, a crushing juggernaut of power going before them.

BY a mighty effort of will the representative of the Supreme Council, recalling its mission, appeared to overcome its momentary instinctive abhorrence at the sight of man. It moved back. The soft glow that flowed from its black shapeless form, whipped and torn until it seemed no more than ribbons of barely visible luminescence, became a placating force.

The Two sensed the change. They paused and held their place. The angry streamers that had lashed out so viciously, the united will-power of mankind, recoiled and wrapped themselves about the Two like a protecting mantle.

Back, also, was drawn the soft glow that enveloped the alien being. In that soft glow terrific power, akin to the streamers enveloping the Two, could be faintly discerned a multitude of sources.

Words and similar means of communication were superfluous between it and the Two. Representing the essence of utterly different civilizations and forms of life, each gauged the strength of the other and found it a thing to be respected. As to an equal, it addressed itself to the Two. From it there poured forth a flood of thought-images that it had been sent across the abyss of space to impart, the Two questioning and answering to queries at intervals. Whatever passed between them must need be so. There could be no fabrication.

Mankind, as a whole, beheld through the eyes of the Two the sorry plight of the inhabitants of the Confederated Solar Systems. Those allied solar systems were many and strong, still against the irresistible waves of Magellanians, agile metal-encased figures bearing a faint resemblances to the human form, who were sweeping everything before them, they could do nothing.

Quick sympathy for those harrassed races sprang up in the hearts of man. In the fate of the Confederation the human race was quick to see its own doom. Quib-

bling over guarantees, treaties, rewards—these were things man of the 20th century might have delighted in, but solar systems were falling before the invading Magellanians and their chance of survival was growing slim. The forces of each species of intelligent life in our island universe were desperately needed out there.

Full and equal membership was offered to mankind. All the knowledge in the various fields of science that the races of the Confederation had laboriously gathered throughout the long ages would be open to each new member. That deep well of knowledge would place man on a par with the most advanced races of the universe.

Too momentous was the question even for the Two to decide offhand. The decision, once made, would be irrevocable. The billions of adult human beings scattered throughout the solar system have to decide for themselves.

Mankind, being in mental rapport with the Two, accepted.

The Lunarians were ignored. Though they did not know it then, two members of a far more aggressive form of life would soon appear in their midst, a form of life somewhat resembling man in physical shape, who would not ignore them.

The representative of the Supreme Council began to impart through the Two certain knowledge that mankind needed to send his representative to the solar system which was the headquarters of the Confederation to take his place as a member of the Supreme Council. Each species was allowed but one member in that great governing body. There was also imparted the plans for the building of a titanic transportation apparatus, through which man could hurl his forces wherever needed at a speed much greater than that of light.

Experts in their various fields received and recorded the information.

There was no need of that being to stay any longer. He re-entered the globe, the hum of the mechanism rose to a shrill whine, died down again to a smooth hum, and he was gone.

Slowly the Two turned and began to move from the globe. Its mechanism still hummed. From out of the heavens two swift ships dropped downward like plummets. Mankind was beginning to withdraw its concentrated will-power from the Two. Human minds were needed elsewhere. Preparations for one of the greatest and strangest struggles the human race ever dreamed of taking part in would have to begin at once. Suddenly the hum of the mechanism within the globe changed to a shrill whine again.

The Two, thinking that the representative of the Supreme Council had returned for some reason or other, turned and made their way back to the globe.

The opening darkened. Something moved swiftly inside. The interior was lit for an instant by a bright purplish light. A metal-clad form, small and active, leaped out. Whip-like tentacles held high a thick metal cylinder from which poured forth an intense beam of violet light. The ray swept over a section of the massed rows of man's most destructive ordnance and metal robots that manned them, twinkled for a moment between violet and ultra-violet, and they were no more. A deep depression in the ground was where they had been.

Behind the first metal-clad figure there was another and another and another. Steadily they poured forth, circling the sphere, taking up defensive positions around it. Before one could think there were scores of those swift-moving invaders about the sphere. Some carried thick metal cylinders such as the first held aloft; others dragged parts of complicated machines which they began to put together with lightning rapidity. Their movements were swift and certain.

The downward dropping ships, which were to carry the Two away almost reached the ground. The violet ray from the thick metal cylinder carried high by the tentacles of the first metal-clad figure touched the nearest one, twinkling for a moment in and out of visibility. The ship dissolved into nothingness as the beam glided over it. It reached toward the second.

A porthole in the side of the second ship snapped open and a human head was thrust out. Taking in the situation at a glance, the head withdrew for a fraction of an instant, then reappeared with a large lethal tube beside it, from which a sheet of livid flame darted toward the metal-clad being who was wielding the violet beam with such deadly effect, destroying him instantly. The lethal tube was next turned toward a knot of metal-encased beings who were working swiftly around one of the machines they were trying to assemble, destroying fully half of them, before a violet beam in the tentacles of another of those beings wiped the second ship out of existence.

Momentarily nonplussed appeared the Two. From them went forth an imperious call to mankind to focus their minds upon them once more. Back began flooding the power. They paused in their stride toward the globe, enveloping themselves in bands of encircling streamers as they did so.

Those metal-clad beings must be Magellanians. Their description fitted with the thought-images which the Confederation's representative had poured forth. They must be confined to the region and exterminated. Confident were the Two they could do it without harming the sphere.

The agile invaders pouring out of the sphere seemed to become aware of the two standing there for the first time. Those holding the cylinders from which poured forth the violet beams of disintegration turned them full upon the two hesitant human beings. The beams touched the streamers, twinkled for an instant between violet and ultra-violet, but could not pass.

The Magellanians acted as if they were surprised that those two bipeds facing them did not vanish instantly under their concentrated beams. It could not have been anything new in their experience; for the members of the Confederated Solar Systems had a power that was akin to the concentrated will-power of mankind, though not so powerful if it was to be judged by the soft glow with which the representative had sought to defend himself against the streamers from the Two.

THEY tried again, the beams seeming to stab viciously toward where the Two stood. Intense grew the beams, blindingly so. Again the streamers proved an impenetrable barrier to those violet beams.

From violet the beams changed to an oddly twinkling blue, shot with tiny darting streaks of white, hovering there as if seeking an opening in the armor of those encircling streamers, changed to a golden yellow, to red, finally disappeared in the region of infra-red—heat.

Around those two lone human beings the air began to shimmer as the vegetation just outside of the streamers burst into flame, then the ground itself began glowing. When it became apparent that heat could not pass, the glow swiftly died down. Just as it was beginning to seem that there would be no further demonstration of their power, everything grew deathly still, then powerful currents of electricity crackled thunderously against the streamers. Yet for all their noisy bluster they beat harmlessly against those protecting barriers.

The beams became visible as violet light again.

Up to now the Two had made no hostile move. They stood close together and watched the invaders, while around them the encircling bands of streamers grew in size and power. Their immunity to the invaders' most destructive weapon—was it their most destructive

The apparatus first of all was housed in a thick globular shell of metal, with but one opening and suspended in a powerful field of force that held it immovable a few feet above the ground.

weapon?—must have caused some trepidation in the ranks of the Magellanians.

The Two waited, protected by the growing streamers, until mankind was once more wholly attuned to them, then one of the streamers unwound from about their forms and darted lightning-like toward one of those beings who had just come from the globe and who, by his mien, was obviously in command; wrapped itself about his metal-clad form and tore him from the midst of his companions to a spot a few feet outside of the encircling streamers.

Into the creature's mind probed the Two. The knowledge it contained was laid bare. Amongst other things they learned that a fleet of invading Magellanian space ships had just been repulsed from the solar system of Alpha Centauri by its fierce inhabitants, who had recently joined the confederation, and who had but just completed a huge interstellar transmission apparatus similar to the mechanism enclosed within the sphere. The Magellanians, using the transportation facilities found upon the worlds they had already captured on the outskirts of our island universe, were not faring so well within the universe's interior.

The invaders, pouring out of that newly constructed apparatus in their large ships, were met by waiting fleets of Alpha Centaurians, who gave them no chance to form into battle formation. Bearing down upon them from every direction, they tore the Magellanian ships to pieces by their ferocity. A remnant of the invading fleet turned tail and sought to escape by the way they had come. Just after the first few ships disappeared into the mouth of the mighty mechanism, it stopped. Two or three ships might have escaped.

The streamers which held the Magellanian while his mind was being emptied, unwound from his form and darted into the metal casing. When it withdrew, there was nothing left but a metal shell that collapsed in a heap upon the ground. The streamer, with a score of others, reached toward the globe and struck swiftly, striking as snakes strike at their prey. Each time a streamer struck, a metal form collapsed upon the ground like a pricked balloon.

The Magellanians, who had been operating the violet beams, threw aside their seemingly useless weapons and plunged desperately in to lend their aid in assembling the machines they had brought with them. It was a race with death. Startling were the deadliness of those darting streamers.

One of their machines was at last completed and from it a dense pall of blackness billowed forth and over the sphere. A brisk wind blowing at the time had no effect upon the billowing cloud of blackness. The wind made it apparent that it was no cloud of minute particles. Soon it hid the sphere and the invaders who still were pouring forth from it.

The streamers entered the blackness, but their deadly accuracy was gone. As the blackness continued to spread over a greater and greater area, the streamers began to find it difficult to penetrate fully.

It was to be expected that the invaders had a means of defense against the deadly force which concentrated will-power of a race could become, otherwise they would never have won past the edge of our island universe.

Hurriedly, the Two began to move away from the spreading blackness. They reached the first line of man's robot-manned ordnance when a second machine was assembled, attached to the sphere. That machine began to nullify both gravitation and the force that held the sphere within its grip a few feet above the ground. Slowly it began rising, then faster and faster. If they could whisk that sphere somewhere out in space, man was doomed.

A third machine was assembled and began hurling a barrage of powerful explosives and deadly gases in the direction of the Two. A terrific roar sounded from within the center of the blackness and another. More machines were nearing completion.

As the Two passed the first row of robot-manned ordnance, sharp clicks could be faintly heard, followed by a rumbling sound that swelled swiftly to a thunderous roar. Louder and louder the massed artillery roared. The robots were bringing their weapons into action at last. The ships high in the air above the rising sphere began to drop their deadly missiles, striking it again and again, blowing it to bits. The ground heaved and sank. Incandescent matter ringed the region, swept toward the center where the sphere had been.

SUDDENLY the roar died down. No living thing was within that circle. Of the metal-clad invaders with the many machines they were assembling there was no sign. A few twisted and fused fragments here and there was all that was left of the sphere and the interstellar matter-transmitting apparatus it contained.

Before the Two had ordered the robots to begin firing, while the black cloud from one of the invaders' machines belched upwards, there had been two terrific explosions and two Magellanians sealed in slender torpedo-shaped shells had been hurled up and away from that region into the vacuum of space between Earth and Luna. Those two shells were tiny space ships. They were somewhat similar to the individual life-ships of space that the larger interstellar craft operating between the planets carried for emergency purposes. About one million miles was their cruising limit under their own power.

Earth was too densely populated for them to return without discovery. Besides, the Two had instilled in them a wholesome respect for the inhabitants of that planet. There remained only Luna with its covered cities, its walled plains, its craters and deep rifts that led far into the moon's interior. There those two invaders must have thought they could hide without fear of detection. As long as even one of them remained alive and at liberty he would be a menace to the inhabitants of the solar system he was in.

Those two tiny space-ships, on leaving Earth's atmosphere, flashed toward Luna and entered one of the deep crevices that radiate in every direction from the crater, Copernicus. Swiftly did they drop down that black forbidding chasm until they reached its bottom, then they shot down sloping caverns and clefts that led from it until they could go no farther. The ships dropped to the floor of the blind cavern and the two Magellanians leaped out carrying cylinders that generated the violet disintegration rays.

No living creature was in sight. The darkness, except in the immediate neighborhood of some luminous planet-life growing at the entrance of the cavern, was that of untenanted space between universes. Equally profound was the silence. The two waited, tensed, for some sign that they had been followed, for eyes that watched. There was none. Silence and darkness reigned.

At last they began to think themselves safe from observation down in that nethermost pit. They did not know that large Lunarian eyes had kept track of them since first they entered the chasm in their tiny craft. Not a move did they make that some Lunarian eye did not follow and report. Those eyes, whose range of vision included infra-red and ultra-violet, found no difficulty in keeping them under observation by the feeble light of the luminous vegetation, or even by the heat waves that radiate from the warm rocks of Luna's depths.

Every cavern beneath the broken surface of Luna, every cleft, had Lunarian-made tunnels running parallel with it. At regular intervals there were tiny openings that gave full view of the caverns and clefts from the hidden tunnels, at other points there were finely balanced stones that could be swung noiselessly aside. Since the advent of man to their world the Lunarians had waited for a certain moment, had even prepared for another biped invasion that was sure to come, if what they planned failed.

While one of the Magellanians kept guard, the other began dismantling the two tiny space ships and one of the deadly ray generating cylinders. From the numerour parts he began constructing an apparatus that was apparently to be used for purposes of communication. After completing the mechanism the metal-clad being manipulated it with his tentacles for some time, then dismantled it and the second ray generating cylinder. Both then began to work frantically to construct an apparatus that bore a rough resemblance to the mechanism that the sphere on Earth had housed.

For the time the two Magellanians were utterly defenseless. Just as they had almost completed their apparatus, a sound disturbed them. They listened. It was a steady plod-plod of some creature approaching. Whatever it was, it made no effort at concealment. It came from the passage that led to the cavern's only opening. The sound stopped. By the feeble glow of the luminous vegetation growing near the entrance, the metal-clad beings made out a Lunarian carrying a lethal tube standing there.

Panic for a moment claimed the two Magellanians. Leaping erect, they turned to flee. A blank wall barred their way. They spun around and faced the Lunarian armed with his deadly lethal tube which members of their race had already learned was just as destructive at short range as their own violet rays. The tube followed their every move.

Seeing that there was only one creature threatening them, each picked up a piece of metal and rushed at the Lunarian. There was a slender chance of reaching him before both were destroyed. One might survive to complete the apparatus and bring their comrades from beyond the edge of the galaxy.

As they left the side of their uncompleted machine, a score or so of Lunarians dropped down from the cavern's roof and stood between it and the Magellanians, who were charging one of the Lunarian's kind at the entrance.

The two metal-clad beings, on hearing the sound of dropping bodies behind them, stopped and spun around. They saw Lunarians dropping steadily, each armed with a lethal tube. Trapped!

Desperately they now turned to try to beat their way past the Lunarian guarding the entrance, but when they turned again they saw, instead of only one menacing figure, the entrance choked with large-eyed inhabitants of Luna's depths. Even as they stood undecided, a large stone slid smoothly aside in the cavern's wall nearest to them and disgorged yet more armed Lunarians. From every direction they were pouring into the cavern.

Realizing at once the utter futility of trying to win to safety in this alien solar system that seemed so admirably equipped to resist foreign conquest, the Magellanians viciously hurled the pieces of metal they still gripped with their tentacles at the nearest of the Lunarians who faced them and waited for death.

Death was not yet to be their fate. The Lunarians wanted them alive. They had already learned what had happened on earth; the casting of man's lot with the Confederated Solar Systems, the invaders' unsuccessful attempt to gain a footing on earth.

No report of their capture was made to man. Spiriting their captives to one of their hidden cities in the deepest of Luna's depths, the Lunarians prepared two large metal cages and locked their prisoners in them. Around those cages they then stationed a guard of Lunarians armed with lethal tubes.

The city in which the prisoners were housed was one of the many hidden cities of Luna, which were making preparations for one desperate attempt at freedom. All the latest weapons of war were being manufactured and stored there. Amongst other things that were being stored in that city were tens of thousands of tiny space ships. Those tiny ships were atomic-powered and lightning fast. They were equipped with a lethal tube of Lunarian invention that was slightly superior to man's most destructive weapon of like size.

No altruistic motive was behind the Lunarian's intention to spare the lives of the two metal-clad captives. They feared the Two and the power they were vested with. Long ago would they have dared to try to win back their world had they but a force to cope with it. And now, fortune sent, came the Magellanians, who had, in the black cloud, a defense against the streamers the Two controlled.

As soon as they numbered the machines for producing the black cloud as one of their defenses, they would be ready to attack, to repay mankind in full. The attack must be launched before man completed the great matter-transmission machine he was planning—otherwise they would have the forces of the Confederation at the entrances to their underground cities.

First, though, they would have to learn if it was at all possible to exchange ideas with their captives. Since those two metal-clad beings had been captured, they had made no sound. Their demeanor, following their imprisonment in the guarded cages, had taken on a noticeable air of sullenness. Had the Lunarians the faculty of thought-transference such as man possessed, the exchange of ideas before them and their captives would have been relatively simple.

The problem of communicating with the two Magellanians, which at first had seemed easy enough, was becoming increasingly more difficult. There was absolutely no starting point. Their captives moved to the middle of their cages and stayed there, making no audible sound except that produced by the movable parts of their flexible metal shells. No nourishment of any description did they take, foods and liquids being kept continuously before them, nor did they seem to be a form of air-breathing life.

Lunarian scientists, trained by man, were secretly summoned to solve the problem. A few at a time came from wherever they were stationed to examine the metal-clad beings and the apparatus they had almost completed. Their temporary absence would go unnoticed in the general excitement of the Solar System's feverish preparation.

Audible sounds, pantomime, and drawings brought no answering gleam of intelligence from them. They might have been, for all the response they made to the efforts of the Lunarians, to communicate with them, mindless machines.

The scientists of Luna had no success until one of their number, first installing a delicate recording instrument capable of recording sound vibrations and electro-magnetic impulses, had the machine which the Magellanians had almost completed before their capture brought near the cages and made a sudden motion with a lethal tube as if to destroy it. A sudden surge of vibrations showed on the recording instrument. The instrument also showed that the vibrations were in a narrow band of electro-magnetic waves. Reproducing

the vibrations with the aid of a loud-speaker, two sharp audible sounds were heard. Ordinary radio waves were employed by the Magellanians to communicate with each other.

The Lunarians, using the same wavelength their captives employed, tried to gain their attention by that means. For a time the two within the cages maintained a stubborn silence, then seeming suddenly to realize that their captors intended them no immediate harm; on the contrary, sought by various means to prove themselves friendly, hastened to learn the Lunarians' speech. Soon they mastered it.

The Lunarians plied them with questions, seeking to learn the secret of the black cloud, promising them life and freedom if they gave it, but on that subject their captives displayed an amazing lack of comprehension of their newly acquired tongue.

Time passed swiftly. Soon it would be too late.

MAN quickly constructed another small matter-transmitting apparatus, protecting it with suitable mechanism that would make it impossible for those metal-clad invaders ever to gain footing in the solar system by that means again, to take the place of the one he had to destroy. Getting in touch with the headquarters of the Confederation, he asked them to prepare quarters for his representative and suite, outlining the peculiar needs of the human creature. After a short lapse of time word came back that everything was in readiness.

One of the men, specially bred and trained to succeed the Two, slim of form with high and bulging forehead, was selected as man's representative and left the solar system to take his place as a member of the Supreme Council. With him went his suite, men of almost the same mental caliber. No lethal weapons did they take with them, unless the human will, which could be tapped by the representative at any instant, could be called a lethal weapon.

Man then, in accordance with the advice of the Confederation's great ruling body, began work on a vast transportation mechanism that would be capable of handling their largest interstellar warships.

At the edge of our island universe the Magellanians were beginning to encounter some real stubborn resistance. Waves of strange life from the interior of the galaxy were hurling themselves upon the invaders with a fury and persistence such as they had never encountered before. They were coming in titanic space ships with crews of ten thousand and more; in smaller, swifter ships, whose crews ranged from five hundred to five thousand; in tiny ten-being ships of incredible swiftness. Armed with forces that wrought havoc silently and swiftly in the void of space; disintegration rays that broke down the molecule, heat waves that fused, electronic streams that penetrated metal barriers and killed, paralyzing beams that held the living immoveable, they converged upon the invading ships from a thousand points. Against the invaders, who were fortifying the worlds they had already captured, they rained down shells loaded with the most powerful explosives, containers filled with chemical horrors. Fearful was the toll of life they were taking and that was being taken from them.

Young mankind fumed and fretted as he trained, fearing that the struggle would be over before man was ready to launch his tens of millions. Another one of those men who were trained to succeed the Two was selected to lead the first of the human forces against the invaders.

Soon would the first wave of human beings be ready. While the older and less fit members of the human race built huge interstellar warships and complicated machinery capable of automatically producing a completed section of those vast ships and other war material, the flower of mankind went through a continuous round of training for their part in the colossal struggle.

Man then tried training a force of Lunarians, but they showed such opposition that the attempt was given up. The Lunarians were becoming more and more antagonistic. Realizing the risk even a hostile force of Lunarians entailed, if left in the solar system with the pick of the human forces at the edge of the galaxy, the Two began seriously to consider giving them back their ancient world with the privileges of full and equal citizenship in man's civilization.

BACK in the depths of Luna the two metal-clad captives were learning the history of the Lunarian race and the bitter hatred of the human species, who were now ruling them with an exceedingly lax hand. Thinking that it was only the natural discontent of a conquered race, they planned to turn it to their own advantage. They did not know that the Lunarians, waiting but word from the Elder City—the Elder City was silent, for 4-P-2269-L, hereditary Overlord of the chief of Luna's underground cities, was still on Earth and under the watchful eyes of Don Stelite—would soon be ready to go forth against their biped rulers. Had they known the extent of Lunarian preparations, they would willingly have given them the secret of the black cloud and any other information that would have aided the destruction of these bipeds who were getting ready to leave for the edge of the galaxy to war on their own kind. War between the civilized races of the galaxy's interior was one thing they were most willing to encourage.

Work upon the first of the great interstellar transportation mechanisms, which was being erected on Earth near the South Pole, passed the halfway point.

The Lunarians woke to the fact that they had little time left. They began to assemble their forces. In the vast subterranean depths of Luna, this rather peaceful race who, aside from the slaughter of their kind centuries back at the hands of man, had never known real warfare began grimly to train. Dividing their forces, they staged thrilling mock combats. Up and down the wide clefts in approved military formation, flashed thousands upon thousands of tiny space ships, harmless beams of colored light stabbed ahead, artillery loaded with blank shells roaring until the endless caverns trembled. Dodging beams, turning, diving, flashed at and passed each other, they came to know the thrill of combat; liked it.

If the Overlord of the Elder City did not lead, then another would be chosen to take his place. Meanwhile they would train. It was their plan, once Earth was conquered, to hold all survivors as hostages, forcing the rest of mankind to refrain from attack on the threat of destroying their prisoners.

From the day following that which 4-P-2269-L had in a moment of desperation attempted to draw a prohibited lethal tube on him, Don Stelite had never let his Lunarian friend go out of his sight. It was only to protect him from himself that he kept him under constant surveillance. The Lunarian, had he known that he was being watched, would have dared the wrath of the Two and fled to Luna to lead the inhabitants of the hidden cities against the vastly more numerous and better equipped human species in a suicidal attempt for freedom.

Though the Two had at all times a fair idea what was going on in the hidden cities, they did not dream that any of the invaders had escaped and were alive down there. Did they but suspect the Lunarians of harboring any of those dreaded Magellanians, the deep clefts

and endless caverns of that dying world would have once more resounded to the march of biped feet, flashing rays and death.

Hearing their guards talking amongst themselves of certain complicated training maneuvers that a special body of Lunarians were going through, the Magellanians, with a touch of incredulity, inquired if they were actually preparing to war upon their biped rulers.

The guards, stung by the tone, replied that they were, outlining some of their preparations. Skeptical, the prisoners asked to be shown. If what they said was true, they would not only give them the secret of the black cloud, but information relating to other weapons as well. Also, if the Lunarians wished, they would complete the machine that had been taken from them at the time of their capture and bring their kindred from beyond the edge of the island universe to help crush the human race.

NIGHT and day men were working on the first great interstellar matter-transmitting apparatus at the southern tip of Earth. It was a titanic affair, capable of swallowing the greatest of the Confederation's warships of space and transporting them to a similar station anywhere in the universe almost instantaneously. It was nearing completion.

The first wave of man's force was ready; giant interstellar warships by the thousands, smaller craft by the hundreds of thousands. Waiting with ill-suppressed eagerness were the crews of those ships for the completion of that instantaneous means of transportation. On its completion they would pour into the mighty vibratory chamber of that apparatus, dissolve into their original energy-particles, flash across the galaxy, reconstruct themselves and ships in the vibratory chamber of the receiving mechanism, and pour into space against the invaders who dared the might of the universe.

The Two, with the eve of the departure of the human forces approaching, decided to give the Lunarians what they long had been clamoring for. Man would relinquish control of the government of Luna to its original inhabitants. Tomorrow 4-P-2269-L and other Lunarian chiefs would be notified.

That evening Don Stelite told his Lunarian friend of the decision the Two had reached. The Lunarian could hardly believe it. He made his human friend repeat it again and again. At last its full significance dawned upon him. No longer would he be merely 4-P-2269-L, but Overlord of the Elder City. In exuberance of spirits he whispered to his human friend something of the forces his race had prepared to win their freedom with, promising now to lead them side by side with the forces of the human race to the edge of the galaxy to the glory of both races.

That night word came from Luna by secret ways to the Overlord of the Elder City bidding him to leave for his ancient world at once. The Lunarian chiefs were contemplating an alliance with an enemy of the human race, the metal-clad invaders, two of whom were now in the depths of Luna completing a complex machine that would bring their kind from beyond the edge of the galaxy.

With the conclusion of that message the Lunarian saw his dream toppling. Yesterday he would have welcomed it, would have dared anything to have left Earth, but today—

His race must not ally themselves with the invaders. They had everything to lose and nothing to gain. The alliance must be stopped at all costs.

He rushed out of his quarters to where he knew a tiny space ship lay hidden and found his friend at his heels.

"What is the rush, Lune?"

Words telling the reason came tumbling pell-mell from the Lunarian before he could think.

Don Stelite drew in his breath with a low whistle.

"What are you going to do?"

"Stop them."

"Does your hereditary position give you the power to override the will of the other Lunarian chiefs?"

"No. Although amongst them I have premier place, only in my own city have I any real authority."

"Do you then intend to tell them of the decision the Two made in regard to your race?"

The Lunarian shook his head.

"Why not?" asked Don Stelite.

"It would be folly. They would take it as an indication of fear on the part of the human race. The majority of my species, recalling past wrongs, would dare much to sweep man from the solar system."

"Then how do you propose to prevent them from joining the invaders?" Don Stelite was puzzled.

"My plan is a desperate one.

"As soon as the Two learn that there are Magellanians in the hidden cities they will, if they think necessary, order your world destroyed to remove the menace it constitutes. The knowledge that we have received from the Confederation in regard to the construction of powerful disintegration rays will make that task simple."

"I know that only too well. For that reason I am sorry that I disclosed what I did, even to you," said the Lunarian.

"What are you going to do?"

"Rid the solar system of them. It is either the lives of those two Magellanians or my race."

A shade passed across the Lunarian's eyes. Some disturbing thought was taking shape in his mind.

"Perhaps it will be wiser if I did not interfere."

"What are you trying to say, Lune?"

"If my attempt on their lives fail," Lune said slowly, "our position, with the invaders also as enemies, will be worse off than ever."

"Casting your lot with the Magellanians will mean war, not only with mankind, but with myriad races of the galaxy."

"My race, the Lunarians, clamors for war. We have millions of tiny space ships suitably armed for interplanetary conflict and crews to man them. The Magellanians are sweeping everything before them. With their aid nothing can withstand us."

"And then what?"

"What do you mean?"

"Do you really think the Magellanians will allow your race to exist after their usefulness is passed?"

Slowly the Lunarian began shaking his head.

"It seems as if my race is doomed either way. I am expected and must hurry. There is still a chance of destroying them and their machine. A swift ship is waiting nearby with a certain design painted upon the bows that will allow it to pass unmolested into the depths of my world; it has been waiting for some time."

The Lunarian started off with a hurried word of farewell flung behind to his human friend whom he never expected to see again.

"Wait," called Don Stelite. "I think it is too late. There is a whisper now going across earth that scraps of conversation in your ancient tongue between members of your race and beings referred to as Magellanians has been detected by sensitive radio receivers. The waves are said to have originated in the depths of Luna under Mare Imbrium near Mount La Hire.

"The inhabitants of the covered-cities of Mare Im-

brium are now being ordered to leave. Countless thousands of interstellar warships are being manned by their eager crews to leave the planets for Luna.

"It is too late, my friend."

"I will go anyway," said the Lunarian in reply. "If I stay it will mean death for me at the commands of the Two. There still is the chance of ridding the solar system if the fleet arrives."

"I will go with you, Lune. Wait a moment, until I get a weapon from my quarters.'

"There are a few small lethal tubes on board the waiting ship. Hurry!"

THEY ran swiftly toward where the ship lay hidden. An airtight door clanged shut and the ship raised its rounded nose and hurtled toward Luna. With scarcely any diminishment of its terrific velocity, the ship plunged into one of the deep clefts near Mount La Hire and sped down the dark gash.

The wide chasm they were plunging down split into numerous diverging clefts. Directing the ship without hesitation into one of them, the Lunarian continued to guide the ship downward. A knife-like wall shot up suddenly and that cleft was split in twain. Black as the tomb had the chasm become. Some patches of luminous vegetation scattered here and there along the precipitous walls only accentuated the darkness.

A ship materialized in front of them without any warning and flashed upwards. Collision seemed to have been averted only by a hair's breadth. Another ship hurtled upwards from out of the black depths. More were coming, hundreds, thousands. They filled the cleft from side to side, barely giving the dropping ship room to pass.

Don Stelite wondered if they were the vanguard of the Lunarian forces on their way out to attempt to conquer the solar system, or were they manned by Magellanians?

At last the mass of uprushing ships came to an end. Like so many streaks they passed upwards. If every cleft and opening in Luna's broken surface spouted forth a like force, man's position in the solar system was far from secure.

Down they dropped, down and down. A faint beam of reddish light stabbed across the chasm, bathed them as they passed. The Lunarian at the controls touched a button and a red glow shot ahead of the ship for a fraction of a second, was extinguished, glowed again for about a full second and again was extinguished. From below, as if in answer to that signal, a huge section of the chasm's wall swung outward and disclosed a dimly lit opening.

The nose of the ship suddenly tilted upwards and they were flying along on even keel, then dipped again. Not straight down a wide cleft were they plunging now, but along a downward sloping passage. The nose of the ship rose slightly. Again were they on even keel. The ship was losing speed. Now they were traveling through a series of vast caverns filled with strange structures and hurrying figures, Lunarian cities. The vast caverns grew smaller and smaller, and ended in a long tunnel that dipped downwards at an acute angle and then levelled out. The tunnel led to another series of caverns, smaller than those containing the Lunarian cities. They were stacked high with all kinds of war material. At the entrance of a cavern slightly less dark than the others, the ship slowed down and stopped.

The cavern, though not as large as those used for the storage of their great heap of war material, was still vast. Its floor sloped towards the center in the nature of an amphitheater, and seemed crowded with a solid mass of Lunarians. Luminous vegetation covered wall and roof. In the center was a slightly raised stone platform on which stood two metal-clad figures, radio apparatus and loud-speakers, and an aged Lunarian who was addressing his audience in what appeared to be fiery tones.

"There they are," Don Stelite whispered, pointing toward the two Magellanians.

The Lunarian nodded. Concealing a small lethal tube in his cloak, he motioned his friend to remain in the ship as he opened the air-tight door and stepped out. Without a backward glance he strode into the cavern with an assured air. As he walked, his form straightened by imperceptible degrees. Truly regal was his bearing when he stepped within the cavern.

At the sharp metallic sound of the ship's door being opened the Lunarians near the entrance turned around. They recognized the Overlord of the Elder City. In some ancient ceremonial form they greeted him. A path was made to the platform. Beside it he stopped and spoke to the aged Lunarian. In the ancient tongue of Luna the aged one replied, motioning to the metal-clad figures once or twice. The Lunarians at the back of the assemblage pressed forward so that they could hear what was being said.

Don Stelite stepped noiselessly out of the ship. No one noticed him. All eyes were directed toward the platform. In his hand he held a small lethal tube. The range of that tube was short. Step by step he drew near as he could to the platform. Another few paces he figured he would be just within the tube's range. About three short steps more and he would be just behind the rearmost rank of closely packed Lunarians. From that point he would attempt to destroy those two.

A harsh voice suddenly came rasping out of the loud-speakers on the platform. One of the Magellanians was addressing the Overlord of the Elder City through them.

Don Stelite moved forward with utmost caution now. One step he took, another, raised his foot for the third and brought it down on a yielding mass which let out a shrill scream. It was a young Lunarian standing behind its parent. The scream so startled Don Stelite that the tube slipped from his fingers.

All eyes instantly turned in the direction of that scream. As those in the rearmost ranks made out the human form, a cry of rage welled up from their throats. They pressed toward him, their eyes glowing with hatred. Another instant and he would be torn to bits.

Don Stelite dropped to his knees and searched frantically for the tube His fingers encountered it just as the nearest Lunarian gripped him. Throwing him off, he sprang to his feet and threatened the mass in front of him with the tube. They fell back sullenly. Still threatening with the tube, he stepped forward in the direction of the platform.

From the loud-speakers a harsh Magellanian voice commanded the Lunarians to step aside and let him deal with the biped. A tiny cylinder appeared in the tentacles of one of the metal-clad figures. From it there began pouring forth a beam of intense violet light.

The man raised his lethal tube and pressed its releasing mechanism. No tongue of lurid flame darted forth. Some way the fall had damaged it.

The violet beam of light swept toward the man. He dodged it. The beam followed. It began to twinkle in and out of visibility. A Lunarian, who tried to stop him, was caught within its light and vanished. Leaping behind a number of Lunarians, Don Stelite dropped to his hands and knees and wriggled swiftly away from the spot. The beam struck the Lunarians behind which he had dodged and destroyed them.

A solid mass of menacing Lunarians now barred the lone human figure on all fours. He leaped to his feet and ran in a zig-zag course toward the entrance of the

cavern. In the ship was another lethal tube. He might be able to reach it. A Lunarian leaped in front of him. Don Stelite, attempting to evade the Lunarian, stumbled and fell. The violet beam swept to him.

FROM beside the platform a sheet of flame leaped out of a lethal tube toward the metal-clad being wielding the cylinder, destroying him instantly in its concentrated flame. The Overlord of the Elder City held the tube.

From the assembled Lunarians there broke forth a murmur of consternation which turned to an involuntary cry of warning. The second Magellanian, metal-clad tentacles whipping the air, was leaping toward the Lunarian Overlord. The tube came around, from it darted an intense tongue of flame and the metal form shrivelled up in it.

Ignoring the threatening looks from those about him, the Lunarian hurried over to his human friend, who was just rising to his hands and knees.

"Don," the voice had taken on a sharp note of command, "get in touch with the commanders of the fleet of interstellar warships approaching Luna and inform them that the Magellanians have been destroyed, that a Lunarian destroyed them."

Don Stelite's form stiffened. A moment later it relaxed. He smiled up at his friend from his hands and knees.

"It is all right, Lune."

"Thanks, Don."

"The thousands of ships we passed, Lune, were they going out?"

The Overlord shot a swift question at those about him. One grumbled a reply.

"Only training," the Lunarian answered.

"Your fellow Lunarians seem to be in an ugly humor," Don Stelite whispered as he got to his feet. "Judging by the black looks they are giving you, you have lost whatever popularity you might ever have had amongst them," said Don Stelite.

"They figure that I have snatched away the one chance of their ever achieving their longed-for revenge with any degree of success," replied Lune. It would not take more than a gesture to send them at us like maddened beasts."

"Look out for that big one behind you!"

The Lunarian Overlord leaped around, lethal tube held menacingly. Don Stelite stepped to the side of his friend, fists clenched.

"Now is the time to break the news of the decision the Two reached regarding your race. With the hope of joining forces with the invaders removed, they might prove willing to listen to reason. You might also tell them something of the fleet that was on its way from the planets; the havoc those thousands of ships would have caused Luna and the inhabitants of its hidden cities."

With the Overlord leading the way, lethal tube held in front of him, his human friend following, they made their way to the platform in the center of the cavern. Grudgingly, a path was made for them. Threats issued from every side. Gaining the platform, the Lunarian demanded silence.

He spoke slowly. He told them that man was prepared to give them equality and relinquish the control of Luna to its ancient ruling houses if they were prepared to shoulder equal responsibility in the forthcoming struggle for existence against the invaders who had come from a far-off universe to try to wrest it from its myriad civilized races. Mankind had already prepared a mighty force whose numbers nearly equalled that of the entire Lunarian race, and that was only to be the first of his legions. Another would soon be in preparation. If the Lunarians equipped and trained a force as large in proportion to their numbers, man would consider that sharing full responsibility.

It was up to the Lunarian chiefs gathered in the cavern to decide. The number of tiny space ships and crews on which they had been willing to stake their very existence to win their freedom would undoubtedly be sufficient.

He came to an abrupt stop. His eyes moved slowly about until they came to rest on the aged Lunarian who had been addressing the assemblage in fiery tones when he had arrived. The aged one shook his head.

"Will you make up your minds?" he asked after several moments of deep silence.

From different parts of the cavern voices began to be heard for and against sending any of their number outside of the Solar System. Some of the Lunarians demanded that a vote should be taken on it then and there. It was taken and found that about half of those present approved of sharing the Solar System's defence if man could be induced to live up to his part.

"Man could and would," Don Stelite spoke up when he sensed what they were hesitating at.

The aged Lunarian, he had dived like a streak from the platform and lost himself in the crowd when the violet disintegration beam and tongue of flame from the lethal tube had flashed, drew himself back upon that place of prominence.

"Chiefs of Luna," he began as soon as he was on his feet, "I had rather hoped that this day would have seen our race allied with the invaders. With their aid we could have poured out of the clefts of our world and spread death and desolation amongst those hated bipeds who enslaved us."

There burst forth a roar of cheering from the assembled Lunarians that threatened to lift the cavern's roof. Threats were hurled at the man on the platform. An uneasy expression came into the eyes of the Overlord of the Elder City as he fingered his lethal tube. It was one thing to destroy the two metal-clad invaders, but quite another to use the tube amongst his own kind.

The aged Lunarian motioned for silence.

"Before the coming of man amongst us," he continued as soon as he could make himself heard, "war was unheard of, the taking of life unknown. They taught us how to take life callously, taught us by bloody example. We had hoped, with the forces of Luna dropping down on Earth like some deadly plague, to show man how well we had learned our lesson."

The cheering threatened to start again.

"They also taught us by example," he hurried on, "how to face death unafraid. Though we have never actually fought, that does not mean we cannot fight!"

"We can!" burst from the assembled Lunarian chiefs.

"I know we can," the aged one continued. "We have millions of our youth trained and anxious to try their mettle. At a word from us they would leap into their tiny ships and follow us out of our ancient world against any odds."

"Let us give the word then!" a young Lunarian chief cried, leaping upon the platform. "On, chiefs of Luna, on to your cities. Call forth your legions and let us go!"

"Wait!" the Overlord of the Elder City cried in a voice that penetrated into the farthest corners of the cavern like some stinging whip.

"Pay no attention to him," the aged Lunarian screamed. "He has lived so long amongst men that his sympathies are wholly with those hated bipeds. He is a traitor!"

"Kill the traitor!" a Lunarian in the rear cried.

"Kill them both!" another shouted and the cry was taken up by the enraged mass.

Lunarians began clambering upon the platform from every side.

"Get off!" the Overlord said in a voice that was as cold as death, turning slowly around with lethal tube held menacingly in front of him.

Hastily did the Lunarians slip off. They recognized death when they faced it.

"You, too," he said to the aged one who was hesitating at the edge of the platform.

There was a sudden roar at the cavern's mouth. A number of tiny space ships came to an abrupt stop and from them there burst forth Lunarian pilots.

"Man is coming!" they cried. "Luna is surrounded by tens of thousands of mighty warships of space!"

"I go to call forth my forces," a Lunarian chief roared. "Who will follow?"

There was a sudden surge toward the walls of that cavern. Orders were snapped and huge sections of the wall began to slide aside.

"Chiefs of Luna," the Overlord cried, "you must listen to me. Forget this madness of going forth against man. You have no chance. It simply will be suicide of our race."

"Are we to forget past wrongs?" a young Lunarian chief demanded, facing the Overlord of the Elder City.

"The past is dead," the Overlord said slowly; "let us bury it."

"Do not listen to him," the aged Lunarian cried. "We have worked and planned too long to let this contemptible trai—"

The word died in his mouth as the Overlord pointed the lethal tube at him.

"Another word out of you," he said grimly, "and it will be your last."

The aged one pushed his way into the mass behind him and disappeared from sight.

"Our ancestors," the Overlord continued, "should have attended to the righting of their wrongs. We have no quarrel with the descendants of ancient man. Are they not willing to return what their forbears took?"

A number of Lunarians were about to interrupt, but he hurried on:

"Fellow Lunarians, I, too, have been in favor of force to regain what rightly belongs to us. Often on Earth have I dreamed of taking my rightful place at the head of the forces of Luna and leading them against the human race. If there was the slightest chance of winning past the mouths of our chasms, I would lead you even now. Too long have we delayed."

"Do you advise us to wait meekly in our cities and hidden caverns to be butchered by those murderous bipeds?" a Lunarian asked incredulously.

Slowly the Overlord shook his head.

"What then?"

"Mankind offers us, if we join them in repulsing the invaders, all that we could have gained by force. I advise that we accept the offer before it is withdrawn."

THE Lunarians gathered in knots to discuss it more fully. Here and there rash chiefs declared loudly that they would sooner die at the head of their legions than to ally themselves with them. Other Lunarians, the older and more conservative element of the gathering, realizing that their chances of winning past the mouths of Luna's clefts was practically nil, began to think seriously of accepting the counsel of their chief.

Well were those Lunarians aware of what was going on at the edge of the galaxy. Many of them had more than once, listening to the reports coming from the area of that vast conflict, wished that they were out there. The thought of actually flashing at an opposing force at the galaxy's edge in their tiny space ships quickened their pulse. Using that as an inducement, the more conservative element finally won over the hot-heads amongst them to throw in their lot with the human species.

A few hours after the decision was reached, the Overlord of the Elder City and other Lunarian chiefs, accompanied by his human friend, left for Earth to see the Two. On the following day the Lunarians returned with a document that gave them equality with the bipeds.

The tiny Lunarian space ships, built to attack Earth, had a maximum cruising range of about one million miles. To make those ships fit for action beyond the Earth-Luna system, they would have to be equipped with small matter-transmitting sets through which supplies could be sent at the almost instantaneous speed of gravitation. Next, more destructive weapons would have to be substituted in the place of lethal tubes. Men and Lunarians worked side by side installing the necessary apparatus in the tiny ships.

Communication between the Two and man's representative on the Supreme Council had been kept up ever since he had arrived at the headquarters of the Confederation with his suite. Facts relating to the combined Lunarian and human forces: the number and size of each class of warships of space, their armament, the crews they carried, and so forth, were forwarded through him to the galaxy's great governing body.

The first great interstellar matter-transmitting mechanism at the southern tip of earth was at last completed. It was tested and found to function perfectly. A huge globular ship of space bearing the emblem of the Confederation shot out of the great opening of the mechanism. The captain of that ship bore orders from the Supreme Council to the Two.

An endless line of space ships moved steadily into the mighty mouth of the great interstellar matter-transmitting apparatus on Earth. The whine of its disintegrating and sending mechanism was awe-inspiring to hear. On their way at last were the first of the Solarian legions.

Huge interstellar warships, giants of the Solarian fleet, had gone first, smaller craft followed. Of those smaller craft there seemed to be no end. Into the mammoth opening that led to the vibratory chamber of that mechanism, they flashed in ranks of five abreast and five ranks high, twenty-five at a time. At last came the rearmost twenty-five. Behind them majestically moved a giant interstellar warship. For a moment it seemed as if it were the last of the Solarian fleet, then out of the heavens dropped another huge space ship, about one-third the size of the giant ship, that bore upon its bow and stern the crest of the Overlord of the Elder City. Following that space ship came tens of thousands of tiny ships—Lunarian legions.

SIDE by side in the forward pilot chamber of that large Lunarian ship stood the Overlord of the Elder City and Don Stelite who had won permission to accompany his Lunarian friend at the head of the forces of Luna to the galaxy's edge. His own ship, the giant that had preceded the Lunarian craft, would take him off out there.

Each was sunk in his own thoughts as the mouth of the great transportation apparatus loomed large. What swift death would they meet out there? Forces even greater than the entire Solarian fleet were known to have flashed from the mouth of great matter-transmitting machines and met instant annihilation before they could strike one blow. What would their fate be?

"Well, Lune, we are next. My ship has just disappeared into the mouth of the transmitting mechanism. Another moment and we will receive the signal to enter."

"I am beginning to feel queer, Don. It is hard to put the feeling into words. I am not exactly afraid, but—"

"I know, old friend. Ever since I boarded this ship I have been feeling the same way. It will pass in a moment."

"You really think so?"

"Sure. In another moment we will be in the sending chamber and past the thinking stage."

The Lunarian breathed deeply.

"Here we go, Lune."

The ship received the signal to enter and swiftly moved into the vibratory chamber of the transmitter. Solid matter under its influence seemed to ripple like liquid. A shrill sounding note set everything quivering. Through its own momentum the ship moved yet further in. A glowing screen from which a myriad pin-points of light were reaching greedily toward the ship barred further progress, while from the sides of the chamber came knife-like beams of pulsating light that seemed to shave off molecular-thin wafers of ship and contents, then questing fingers of force sought out each atom and tore it asunder.

Out of another vibratory chamber on the outermost planet of a far-off solar system flowed the Solarian forces.

Up and out of that atmosphere and into the void of space the Solarian ships hurtled. Orders came to halt and form themselves into orderly ranks.

The Lunarian legions were the last of the Solarian forces to issue from that interstellar transportation apparatus on that outermost planet. The Lunarian leader gave the order to his forces to form themselves into orderly ranks. Up and down the lines of tiny ships from Luna the leader of the Lunarian legions in his large ship flashed, then took his place at their head and waited for further orders.

Orders came to Don Stelite to board his ship. The Solarian forces would soon be moving off.

The giant warship of space, which Don Stelite commanded drew near the Lunarian ship. Two members of the Lunarian crew brought the man a semi-rigid pressure-suit equipped with a tiny propulsive beam and helped him into it. Before the helmet of the suit was screwed down the man bid his friend farewell. Together they went to an air-lock nearest the approaching ship. The man, moving awkwardly in the bulky suit, stumbled, and would have fallen as he stepped within the air-lock, if the Lunarian had not steadied him. A moment later he was in space, speeding toward his ship.

The Lunarian hurried to an observation window. He was just in time to see the giant space ship go hurtling toward the other mighty ships of space.

As the Solarian fleet moved forward, another fleet of ships began emerging from the atmosphere of the world that they had just left. And then from other planets of that solar system, there must have been at least ten, some on the other side of their sun, came yet other fleets from matter-transmitting machines on those worlds. One by one they fell in behind the Solarian fleet which in turn was moving off to that huge gathering of fleets far ahead.

Slowly the Solarian fleet caught up with the huge gathering of fleets it had been ordered to join. Behind, and on either side, were other fleets pouring from that solar system which had received similar instructions from the galaxy's great commanding body. The entire force moved slowly as if waiting for something.

Then from the direction of an exceedingly bright nearby star that could not have been more than one-sixth of a light year off, came a mass of ships. Long before they had been sighted, the automatic devices for detecting matter in space had pointed in their direction and had given their total mass and distance, and the speed at which they were approaching. The vanguard of that approaching force, a solid wall of ships from which poured forth a flood of disintegration beams to clear their path of all interstellar débris, flashed into view. Stretching far into space in the direction of that nearby star came the main body, a myriad quivering lines of ships. Passing all comprehension was their number. They, too, bore the emblem of the Confederation.

At a speed approaching that of light they drew near the slow-moving fleets. To the commander of the Solarian fleet, as well as to the commanders of all the other fleets, came the order to speed up. As the vanguard of that mighty force swept past the host of ships of which the Solarian fleet was now part, it was increasing its speed swiftly and smoothly. When the mighty force behind the vanguard came abreast, it, too, was flashing along at that terrific velocity. Side by side the two vast aggregations of fleets swept along.

From a half score other nearby stars came other quivering lines of ships composed of fleets from thousands of solar systems. All of them bore the emblem of the Confederation. The forces of the galaxy were gathering for a supreme effort.

At the headquarters of the Confederation thousands of strange creatures, no two alike, representatives of their races, stared moodily at a large television screen, darkening at intervals, that showed yet another of the forces of the galaxy being destroyed by the invaders.

WHEN the Magellanian hordes had come within a certain distance of our island universe, ten immense fleets had split from the huge column and sped off while the main force came to a slow stop and hung motionless in space. With each of the ten fleets there went six huge globes of planetary dimensions. So great was the number of ships of each of those ten fleets that nothing could withstand them. Down they swept through the Confederation's defences, sweeping solar system after solar system bare of their original inhabitants, replacing them with their own metal-clad species from the huge globes.

On the planets they had captured, they found immense structures housing complicated apparatus, whose purpose at first puzzled them. They were the machines used by the vanquished races to instantly bridge the void between their solar systems. The Magellanians had long been familiar with the mechanism for transmitting matter on directed radio waves, but not on gravitational lines of force. Quickly they solved the use of those structures. Using the transportation facilities they found, they swept into the interior of the galaxy to spread death and desolation.

Outside of the island universe there still remained the main column. For a while it remained motionless in space, then it began to move forward, an invincible force. In front of them sped a closely packed mass of giant ships of space, from which poured myriads of powerful disintegration beams. The only defense against those disintegration vibrations were like rays of equal strength to neutralize them, more powerful rays would sweep the vibrations back to their source and destroy them.

Hastily the Supreme Council gathered together what fleets it could from hundreds of solar systems and sent them forth against the Magellanian column. Numbered amongst the first gathering of fleets were pleasure-craft with various forms of armament hurriedly added, lumbering freight-carriers, and ships built for various purposes that had nothing to do with interstellar warfare.

Greatly outnumbered and outclassed though they were, they hurtled fearlessly at the mighty invading

force that seemed to extend in all directions into the infinite.

Steadily the Magellanian column swept forward. Each of the countless myriad beams that formed the practically solid wall of disintegration rays before the advancing Magellanian column was more powerful than the most powerful ray the ships of the Confederation possessed. Matter in front of those rays was being swept out of existence at the rate of five thousand cubic feet per second. It was only by being shielded by the ships in front that those behind escaped destruction, for yet a little while.

In desperation the rearmost fleets of the Confederation swept around to the comparatively unprotected flank of the great force and were shattered. The broken fleets drew slowly away from the side of the Magellanian column against which they had vainly broken themselves, reformed their thinned ranks into some semblance of order and plunged again at the invaders. Swift was their doom.

Again the Supreme Council gathered together fleets of slow and awkward ships—hopelessly undermanned—and hurled them at the enemy. Another gathering of fleets was brought together, smaller in number than the two preceding forces, and launched at the seemingly invincible foes from an alien universe. They met an even swifter fate.

Paying no more attention than to brush off the fleets from the galaxy as if they were so many troublesome insects, the invaders continued their course. Coming within a certain distance of the edge of the island universe, the great column came to a slow halt again. Ships were shifted back and forth. Intense activity was going on in the center of the column around the remaining globes of planetary dimensions. That activity did not augur well for the races of the Confederation.

Thousands of tiny ships operated by remote control and carrying television apparatus were sent out to keep watch upon the Magellanian column. Those small ships were nothing but tiny dark bullets carrying no light and amazingly fast. Through them came the first inkling that the column was slowing down and coming to a stop. On huge television screens at the headquarters of the Confederation the intense activity within the column was watched with great anxiety. The column was splitting into three parts, the center force beginning to resume the column's forward sweep to the galaxy, the other two forces were veering off to attack it from different points.

The Magellanians commanding the main column before it split must have grown contemptuous of the strength of the defenders, for ridiculous was the ease with which the fleets of slow ships armed with puny rays and obsolete cannon firing explosive missiles attempting to bar their way had been destroyed. They may have conceded that the creatures manning those ships of space were brave enough, but the ships, compared to their own mighty fighting craft, were hopelessly outclassed.

In the interval of time while the invaders had stopped and divided their column, the Supreme Council had gathered together from the ends of the galaxy one of the greatest aggregations of fleets that the allied races of the Confederation had ever assembled before, fleets of real interstellar warships built for the express purpose of stopping the Magellanians.

As soon as the television screens showed that the center column was resuming a forward course, the Supreme Council ordered the assemblage of fleets from hundreds of different solar systems waiting at the galaxy's edge to be launched. Hardly had they disappeared into the distance when they ordered another vast gathering of fleets to proceed to the frontier of the island universe by means of matter-transmitters. As soon as enough fleets were assembled they launched them after the first. A short interval of time elapsed and then another countless host of ships was ordered out. Following that was still another, each greater and better equipped than its predecessor.

The tiny ships equipped with television apparatus showed the center column rushing toward the galaxy with swiftly increasing speed.

Soon would the four hosts of ships bearing the emblem of the Confederation strike one after the other, halting and taking a terrific toll of those Magellanian ships.

WORD went to the waiting galaxy that the advancing Magellanian column had been detected at last by sensitive instruments aboard the foremost of the first mighty gathering of fleets rushing outward to meet it. Orders went darting through the lines of those fleets. Forward shot the mightiest interstellar warships of that first host to bear the brunt of the attack and shield the smaller craft behind until they were near enough to use their weapons.

The invaders were now sighted with the aid of powerful space-penetrating apparatus aboard those foremost ships. Though the column's way was barred by massed fleets of ships of every shape and size, stretching as far as eye or instrument could penetrate, they came on with no perceptible slackening of speed.

At the headquarters of the Confederation the representatives of the various allied races saw on the huge television screens the Magellanian column hurtle steadily forward to blast and disintegrate its way through. No doubt they thought they would make as short work of the rash and presumptious creatures, who were daring to bar their way, as they did of the other forces that had been sent against them.

Far in front of the Magellanian column swept a solid wall of giant space ships from whose millions of projectors poured an unbroken flood of disintegration vibrations.

The ships hurtling outward from the galaxy did not slacken their terrific velocity as the much greater force came rushing toward them. No powerful shield of disintegration rays preceded the ships on which was emblazoned the faintly luminous patch that resembled a spiral nebula from which a streak of lightning was darting forth. All of their mighty weapons were stilled. Until an order came to loose them, no power would be fed into the deadly projectors.

The part of the galaxy from which man had come was to be represented in the forthcoming battle. A fleet from the solar system of the Alpha Centauri was at the very forefront of the Confederation's forces. A fearless race were they.

Close were those two forces now. The distance separating them was just a little more than the distance it would take light twenty-six hours—Earth time—to cross.

Would the order to loosen their powerful rays never be given?

Nearer swept those two fleets, nearer and nearer. Twenty light-hours separated those onrushing forces, nineteen light-hours, eighteen light-hours, still were the weapons on the ships rushing outward from the galaxy silent.

The order to loose their weapons came!

From the fleets of the Confederation a raging inferno of destructive forces swept at the speed of light to meet the shield of disintegration rays pouring from the approaching ships. Back were those rays driven as rays

of slightly superior strength were hurled against them. With those vibrations, that broke down molecular equilibrium, went other rays. Magellanian ships began to glow red, then white, as heat rays picked them off; disappeared as more powerful disintegration beams drove back their own destructive vibrations and enveloped them. As the distance lessened, the number of those giant ships bearing the powerful disintegration ray-projectors far in front of the Magellanian column dwindled fast. Few of them reached the foremost ranks of ships bearing the emblem of the Confederation.

The mighty invading column behind, receiving sudden warning of the deadliness of the ships in front, tried to swerve, but were met by ships bearing the faintly luminous patch resembling spiral nebula they were attacking.

Into a blinding, blazing day was the eternal night of that region turned, as ships began to meet ships in head-on collision and were vaporized. Other ships behind the front ranks began to glow red, became blindingly white, then masses of molten metal, as heat waves caressed them; became strangely silent as electronic streams rushed through metal walls and stripped flesh and life from the living forms; crumpled up as ships out of control careened into them; exploded into thousands of fragments as tiny missiles loaded with atomic-explosives found their mark; disappeared in puffs of hazy light shot with many coruscating streamers as disintegration rays enveloped them.

Those masses of ships plunging recklessly into each other seemed just to melt away. At that rate one or both forces would soon be destroyed.

The invading column began to slow down, forcing the galaxy's fleets to do likewise. Countless was the number of mighty space ships the invaders had lost. Ships bearing the emblem of the Confederation had not escaped unscathed. Their loss, though appalling, was not nearly as great as that which the invaders suffered.

The two forces came to a stop. Their front ranks, enveloped in clouds of incandescent gases and molten metal, drew back from each other. Beyond the range of their rays they halted.

A great force split from the Magellanian column and plunged forward to sweep the fleets of the Confederation aside. That force did not leap rashly forward as the ships at the forefront of their column had done. The ships opposing them were not slow-moving space craft with obsolete armament. They were mighty battleships of space, some even superior to their own.

The ships from the galaxy drew themselves up in battle formation and waited. They had been ordered to hold the invaders back until reinforcements came.

Swiftly the force that had split from the Magellanian column drew near the waiting ships. Destructive forces met and clashed. The battle raged with swiftly mounting fury. Ever the area of death and destruction widened. Each force began to pour forth solid clouds of huge missiles loaded with all forms of destructive agents. Even the tiny ships at the edge of the conflict, those operated by remote control and equipped only with television transmitting apparatus, were being struck frequently. Soon the television screens at the headquarters of the Confederation were quite dark, as the last of them was destroyed by random missiles.

Reports from that battle area went flashing back to the galaxy that the invaders, seeking desperately to break through that assemblage of fleets, were stopped again and again. Though the Magellanian ships greatly outnumbered their own, though their apparent disregard for life was such as they had never imagined living creatures to possess, they were holding them back.

Gaping holes began to appear in the ranks of ships attempting to bar the invaders. The Magellanians, sensing a quick victory, threw tens of thousands of their mightiest ships forward again and again. Under those continual batterings, the fleets of the Confederation were rapidly being destroyed. The invading column was prepared to move forward again, when from the direction of that huge sprawling galaxy in front appeared another mighty aggregation of fleets of all shapes and sizes bearing the emblem of the Confederation. That second host of ships was greater than the first. Swiftly did they leap forward to fill the gaping holes in the barrier.

Again did the Magellanian column smash against the now reinforced wall of ships. But as fast as a ship in the front lines was destroyed, another took its place. Each effort of the invaders to sweep around that immovable obstacle was met and stopped by swift moving fleets held in reserve.

The barrier of ships before the invading column once more began to crumple. Another terrific lunge at the barrier, and it would be swept aside. The Magellanians were preparing to deliver that final blow and proceed, when another vast array of ships from the galaxy was sighted sweeping swiftly and majestically forward to strengthen their broken lines. Greater than the other two was that third force.

Upon the barrier that was growing ever stronger the invaders once more began to batter. No longer did their bravest leap forward to clear the way. Grimly their whole column hammered the barrier.

Though the invaders had suffered terrific losses, they still had the advantage of numbers. Slowly was that immovable wall of ships being worn down. Soon would the way be clear.

Furiously the invaders now beat against the opposing lines of ships that were threatening to collapse. They were preparing to deliver that final blow when another mighty force was sighted sweeping forward to strengthen the crumbling barrier, a greater force than any of the other three.

THE leader of the Lunarian legions and his human friend communicated little with each other during the first few days—Earth time—the great array of ships were hurtling outward from the edge of the galaxy to reinforce the mighty aggregation of fleets which had preceded them. Gone from the Lunarian's eyes was the haunting fear that his race might forsake the cause of the Confederation and go over to the Magellanians. They would not dare. If any Lunarian chief was contemplating such a move, he had but to look out of the windows of his tiny ship to see as far as eye or instrument could penetrate, the endless lines of ships of every shape and size gathered from thousands of solar systems within the interior of the galaxy to repulse the invaders. There, somewhere in the center of that vast host, the Solarians, both men and Lunarians, began to see themselves in their true perspective.

Far ahead was the scene of that titanic struggle. As interstellar distances go it was ridiculously small; still, even though the fifth host was rushing forward at the utmost limit of its speed, more than a year of travel at a velocity approaching that of light must pass before they would reach it.

Automatic devices aboard the Solarian ships took over the control of the ships after the final shifting of fleets into the places allotted to them. Soon would time begin to hang heavy on the hands of the crews. Little would they have to do for a while. The driving mechanism of the ships was wholly automatic.

Don Stelite, gazing out of the telescopic windows in the control room at the disk-shaped ships, wondered what manner of creatures manned them. He did not think they resembled man. Few forms of life in the

galaxy did. Trying to imagine their shape, he let run through his mind some of the myriad forms of life dwelling on earth and other planets man inhabited. Instinctively he knew that none of those he brought to mind resembled them. An odd notion came to his mind that the creatures resembled their disk-shaped ships. As that thought flitted through his brain, he had a feeling that someone near had read his thoughts and found them exceedingly amusing. He willed his mind to become blank. As he did so, he seemed to hear a sound resembling a chuckle immediately behind him.

Don Stelite whirled around on his heel. There was no one in the control room at the moment besides himself. Again he thought he heard a chuckle. He sensed that whoever had read his thoughts and was laughing at him was not within the confines of his ship. Coldly then came the knowledge that it was not a human being who had penetrated his mind.

Half believing his imagination was playing him tricks, Don Stelite stared out of the observation window nearest him to the disk-shaped ships again. His gaze was attracted to an observation window near the forward edge of a ship flying parallel with his own. Something moved jerkily behind that window.

"Hail, Don Stelite."

Thinking that some one had spoken the words in his ear, Don Stelite spun around. No one was near him. Sheepishly he turned to the window.

"I, Zerbin, of Arete 6, greet you."

"I greet you in return, Zerbin of Arete 6," Don Stelite replied mentally.

"Forgive me for startling you. You were trying to imagine the form of my species and I could not resist the impulse to hail you."

"You are one of the beings aboard a disk-shaped ship?"

"Yes. I command the ship flying parallel with your own. Seeing you staring fixedly at my ship I took the liberty of reading your thoughts. The forms of life you likened my species to caused me much amusement. We resemble nothing within your solar system."

"Then what can you possibly look like?"

"Curiosity, I see, is one of the weaknesses of your biped species."

"Reading my thoughts showed no restraint of curiosity on your part," said Don Stelite.

"Also, I fear, one of the weaknesses of the inhabitants of Arete 6," was the reply. "Our races have at least one trait in common. Do you still wish to see what we look like?"

"I do," Don Stelite replied, feeling himself strangely drawn to the captain of that disk-shaped ship.

"I will impress a picture of myself upon your mind."

Like an object taking shape on the screen of a television screen, a picture formed itself in Don Stelite's mind.

"Impossible!" Don Stelite ejaculated. "You are trying to amuse yourself at my expense. No such form of life could possibly exist.

"No? Then perhaps the inhabitants of Arete 6 have for countless ages been deceiving themselves in regard to their existence."

"Such a form of life is impossible."

"Perhaps in your solar system, biped."

"I—I—"

"Some of your observation windows are, I see, constructed on the principle of the refracting telescope. You recall seeing something move in an observation window near the outer edge of my disk-shaped ship. Adjust one of your space-penetrating instruments so as to bring that window sharply into focus," said Zerbin of Arete 6.

Don Stelite did so. The telescopic window brought the observation window at the forward edge of the nearby ship very close. The creature standing there stood out clearly. His eyes confirmed every detail of the picture that had been impressed upon his unbelieving mind. Incredulity gave way to an emotion that shook him in its grip. He sought desperately to suppress an overwhelming desire to laugh, to laugh uproariously. He could not check it. Laughter burst from his quivering lips.

"Laugh, biped."

Don Stelite controlled himself with an effort.

"Zerbin of Arete 6, I apologize."

"There is nothing to apologize for. When first I made out your strange biped form standing outlined in the observation window next to the telescopic window, I also gave vent to laughter."

"The human form is not as ridiculous as your—"

"No? Let us not quarrel on that point. Be thankful that each race has its own conception of the ridiculous and the sublime. I would be friends with you, biped."

"Gladly do I accept your offer of friendship. Though our forms differ greatly, I think we will find much in common."

"We will."

"According to the bright spot in the Confederation's emblem etched on your ship, Zerbin of Arete 6, your solar system is in the same region of space as ours. I half believe that our suns are near neighbors in space."

"Picture the heavens as visible from your solar system, biped. Not so fast. Wait. Hold that section in your mind. Go back a little. That is it. Our sun is that bright white star."

"Altair, the first magnitude star in the constellation of Aquila?"

"Your constellations are meaningless to me. Bring to your mind again the section of the heavens in which shines the star you call Altair. Yes, that is your star."

"Then we are indeed neighbors. Altair is but fifteen light-years from my own solar system, one of our nearest neighbors in space."

"Now I recognize your rather feeble sun, biped. Long have our astronomers sought to discover whether or not your star had any planets revolving about it. Their researches led them to believe that only one huge planet revolved about your sun. An extremely minute irregularity in your sun's proper motion through space was the basis of that conclusion. Were they right?"

"Nine planets revolve about our sun, seven of them in turn have from one to nine satellites. My race dwells on several of those worlds."

"It seems as if the astronomers of Arete guessed wrong."

"And Altair, has it a large family of planets?"

"Around our sun, which you call Altair, there revolves but one planet, a huge one, which we call Arete. Six large satellites of approximately the same size spin around in their orbits at varying distances from the surface of that planet. We, the ruling organisms of that solar system, inhabit five of the six satellites."

"I would like to visit your solar system, Zerbin. If I survive this terrible conflict, I will try to gain permission to visit it. Matter-transmitters will now make the journey comparatively simple."

"In the time of war, biped, do not tempt fate by making plans for the future."

"If the Magellanians had not come on their mission of invasion, I might some day have visited your solar system. On the day my race received the message from the Supreme Council, I was to command one of a score of ships that was to leave our solar system on an expedition to a double star we call Alpha Centauri."

"Alpha Centauri? Bring to your mind the section of the heavens in which it is situated. I have it now. Well is it for you that you did not start on that expedition. The inhabitants of that solar system are an extremely ferocious form of life."

"Do you know the Alpha Centaurians?"

"Well do we know them. The ruling organisms of the solar system which you call Alpha Centauri visited our solar system ages ago. Their civilization is much older than ours. They were seeking new worlds to colonize when they visited us. The only thing that saved us from extermination was the fact that oxygen is very destructive to their tissues. Oxygen, luckily, comprises nearly fifty per cent of our atmosphere."

"What form of atmosphere were the Alpha Centaurians used to?"

"The atmosphere of the worlds which the Alpha Centaurians inhabit is composed mainly of cyanogen gas."

"Cyanogen gas! That gas is one of the most deadly to my race. If I ever visit their solar system, I will make sure that my pressure-suit is gastight."

"The Alpha Centaurians allow no visitors from other solar systems to land on the planets they inhabit—at least they allowed no one to visit their solar system prior to joining the Confederation. They destroyed many a space ship that sought to land despite their hostility. The ruling organisms inhabiting a number of planets revolving around a small reddish star almost declared war on the Alpha Centaurians because they fired on one of their space ships."

"The small reddish star, is it also one of our near neighbors in space?"

"Very near. It is about a third as luminous as your own sun. Bring to your mind the nearest red stars to your solar system. That is it."

"Tau Ceti?"

"Yes. The ruling organisms of that solar system man the fleet of mighty cube-shaped ships flying above your own. I met a few of them mentally when we fought the Magellanians who had invaded a solar system near the edge of our galaxy. They are brave and a fine form of life."

"You have already fought against the invaders?"

"This is the second fleet from my solar system. Practically the entire first fleet was destroyed when we met the invaders at the edge of the galaxy and repulsed them from the solar system they sought to capture. Not one of our disk-shaped ships escaped unscathed. Mine was almost a total wreck. It was scrapped when I brought it back to my own solar system."

"Are there any other fleets from the solar systems near our own?"

"Of course. The matter-transmitter on that outermost planet from which your slender ships poured was tuned to the stars from our immediate neighborhood. Did you not know that?"

"No. The commander of my fleet may have, but not I."

"From the yellow star known to you as—recall the nearest yellow stars about half as luminous as your sun—Mu Cassiopeia came the cone-shaped ships following the giants of your own fleet. The fleet of torpedo-shaped ships in front of your own are manned by the ruling organisms from the planets revolving around the twin stars of—a pair of small yellow stars—Xi Ursa Majoris. The star you know as—bring to your mind some of the huge nearby white stars—Vega sent the fleet of mighty globular-shaped ships."

"Well represented is our local star cluster."

"Very well, biped. I must break off communication with you now. There are some duties I must attend."

Don Stelite made a round of his own ship. Later he got in touch with his Lunarian friend and related some of the telepathic conversation between the captain of the disk-shaped ship and himself.

Many were the long hours that Don Stelite whiled away with Zerbin of Arete 6 during the days that followed. Mentally he made the acquaintance of many of the captains of the various shaped ships surrounding his own fleet. He came to know and then to number amongst his friends one of the captains of the mighty, cube-shaped ships from the solar system of Tau Ceti, one by the name of Aaxo of Planet 2. As time passed Aaxo, Zerbin, and himself became a mentally inseparable trio.

NEARER and nearer that fifth great host was rushing to the aid of the great aggregation of fleets ahead of it. The fleets of that preceding host were bravely sacrificing themselves to hold back the invaders.

From far ahead came the despairing reports that the fourth of the Confederation's forces were going down fast. The Magellanian column was still superior in numbers and was making itself remorselessly felt.

There followed a short period of silence in which it seemed as if every ship and every member of their crews were too desperately occupied to spare time even to send back their bare reports. Then came word that the Magellanian column, broken and shattered from repeated battering upon the immovable barrier—falling fast was the barrier now—were re-forming its thinned ranks and preparing to rush forward again. Another message started coming . . . was broken off. After that, silence.

It was now up to the host of ships, of which the Solarians were part, to stay the shattered column. That should be easy. There could not be many of its ships left. Shortly should it be sighted. Accompanying that fifth host were many tiny ships equipped with television transmitters that were operated by remote control. Their television apparatus was mostly trained ahead to catch the first glimpse of the shattered Magellanian column.

Ahead of one of those tiny dark bullets, far in front of that fifth host, there suddenly appeared a score or so of Magellanian ships. They were moving slowly in the same direction as that tiny ship. They, too, apparently had been sent out for the purpose of reconnoitering. As soon as their space-penetrating instruments told them of the vast assemblage of approaching fleets, their speed increased and they disappeared. The tiny ship operated by remote control leaped forward to follow them. Back at the headquarters of the Confederation the television screen tuned to that particular transmitter showed the Magellanian scouts being overhauled, then the screen darkened abruptly.

Hurtling along at almost the velocity of light came the great gathering of fleets bearing the emblem of the Confederation. Before it moved an unbroken shield of destructive vibrations to clear the path for the ships that followed.

At the Confederation's headquarters the television screens tuned to the tiny ships preceding the fifth great host brightened. Suddenly they saw, that far ahead of the closely packed ranks of ships from which poured the countless beams forming shields of all-destroying vibrations, was a mass of débris, stretching in every direction. In some spots the débris was judged to be piled in solid masses thousands of miles thick. Those masses bore rude resemblance to the Magellanian globular transports of planetary dimensions. There were also riddled and shattered ships of all shapes and sizes, fused masses of metal still glowing, frozen gases, and stiff broken things of a myriad shapes that had but recently been living creatures endowed with reasoning and a high sense of loyalty. Over it all drifted a pall of

impalpable dust. No sign was there of the Magellanian column.

The fleets were warned. They slackened their speed. Through that débris swept the foremost of their ships, wiping out of existence, as they swept along, all matter that lay in their path. Wrecked Magellanian ships and ships bearing the embelm of the Confederation were intermingled in world-large masses. At last they emerged on the other side of that late battle region where the bravest and finest of thousands of races had sacrificed themselves; still no sign of the invaders.

Fleets of swift scouting ships were thrown far ahead. The fifth host reduced its speed until it barely seemed to move along.

A fleet of the Confederation's greatest interstellar warships were ordered ahead to investigate. Soon did that fleet make out the titanic globe. The Magellanians operating it had in turn become aware of the fleet of warships overtaking their mighty inter-galactic transport.

Upon the approaching fleet a few disintegration rays were directed. They were turned off one by one after a few moments, for they saw that the rays from the approaching ships were far more powerful. Then, from thousands of openings in the surface of that battered transport, there issued clouds of tiny space ships which moved off toward the fleet that was rapidly overhauling the globe. Those small ships might have been useful in swooping down upon unprotected solar systems in their thousands to spread death and destruction, but coming slowly as they did against the huge ships, they were useless.

From that globe there next poured wave after wave of metal-clad figures, bearing in their tentacles cylinders from which poured an intense light. Pointing those cylinders at the rapidly approaching ships, the metal-clad figures flashed away in the opposite direction at a swiftly increasing speed. Their versatile cylinders were now generating propulsive rays.

The fleet of giant space ships split in two, half of the ships shooting forward at their greatest velocity to try to intercept and destroy those escaping Magellanians, the other half drew themselves up in long lines and proceeded to bombard that immense globe.

As the ships in pursuit of those tiny dwindling figures neared the huge globe, it burst suddenly into a blinding mass of incandescent gases and flying metal. Only the terrific velocity at which they were traveling saved them from instant annihilation. The other half of the fleet was caught within that expanding shell of flaming gases and destroyed before they could gain enough velocity to escape.

No time could be spared just then, even by the remaining half of that fleet, to overtake and destroy those beings clad in metal, who had escaped with the aid of their propulsive rays, for beyond the straggling line of crippled space ships ahead, the rearmost rank of the Magellanian column had been sighted by both the scouts and the tiny ships operated by remote control. All fleets were speeding up to overtake the retreating column.

In a great circle the rearmost ranks of the Magellanian column swept around and headed back. Over as much area as possible they spread and tried to hold back the fresh forces from the galaxy, while their own shattered column drew away with as much speed as it could muster.

From the vast host, fleet after fleet of giant interstellar warships, amongst them the thousands of the largest Solarian ships manned by eager bipeds, whose yearning for action would soon be appeased, sped ahead to clear the way. The weapons that those great ships bristled with were so destructive that it needed no more than to be touched or struck by their missiles to be either no longer in existence as molecular matter or to be reduced to shattered masses of metal.

DON STELITE, having dodged death by a hair's breadth, got in touch with his Lunarian friend and described the few tense moments that intervened between the instant a seemingly wrecked and lifeless Magellanian ship turned suddenly upon his ship with a powerful ray as he was about to flash by, and his escape. Only the intense vigilance of the men in the pilot chamber saved the ship from instant annihilation as they swerved the ship sharply. A Solarian vessel following, wiped that wreck out of existence. That was his first experience with the enemy.

Fleet after fleet of huge ships darted forward again, Solarian ships in their midst, and cleared the way.

Once more did the human bipeds in front describe to their friends in the rear the part they were playing in that mighty conflict. Envious crews of the smaller Solarian craft bewailed the fact that they were not aboard the huge ships in front.

From the vast array of ships that had poured from thousands of solar systems within the interior of the galaxy at the bequest of the Supreme Council, a huge force went forth to meet and destroy what remained of the Magellanian column. Terrific was the shock of the destructive forces of those two great interstellar armadas meeting. Now the concentrated power of one side forced its way through the shield of disintegration rays and wiped out thousands of ships; now the other.

As the front ranks of the opposing forces rushed closer and closer their speed did not slacken, but increased. The black night of that region was again turned into day as ship met ship in headlong collision and were vaporized. Every weapon was brought into play. Each passing instant saw the fury of that battle mounting.

In every direction scattered what was left of the invaders, with the ships of the Confederation in pursuit. The disabled ships in the rear of the column, as flight for them was out of question, stood and fought valiantly. Through them, dealing death and destruction, plowed the victorious fleets.

On the television screens back at the headquarters of the Confederation, the destruction of the last of that Magellanian force was viewed with elation. Great was the rejoicing amongst the races of the galaxy when they received that news. The invaders were not invincible. Many of the races, whose solar systems were at the edge of the island universe or near solar systems in possession of the invaders, took on renewed hope.

The whereabouts of the other two parts of the main column was not known. Long ago had they disappeared. Black were the television screens tuned to the tiny ships equipped with television transmitters sent to follow them.

An order came to the victorious fleets to return to the solar systems at the edge of the galaxy and re-enter the transmission apparatus on those worlds. Each fleet was to return to the matter-transmitter that had brought them from their own solar system to the galaxy's edge.

Fleet drew away from fleet and formed into orderly rank. Roll was called and the missing and crippled ships reported back to the Supreme Council. Relatively small were the losses suffered by the Solarians. Only a few hundred of their largest ships. The Lunarians had taken no part in the struggle.

Zerbin of Arete 6 got in touch with Don Stelite to say that he was alive and his ship untouched. Not so fortunate was Aaxo of Planet 2. His ship was so badly battered that it had to be abandoned.

Back then the fleets started flashing to their galaxy.

The crippled ships were left behind to make their way back as best they could.

Orders came out to them to hurry. The Magellanians in the interior of the galaxy, learning that one of their main reserve forces beyond the edge of the island universe had been wiped out, were sweeping through solar system after solar system with renewed fury.

The great array of fleets that had destroyed the remnant of center column was to be divided into hundreds of separate fleets and sent to the solar system in the interior, where they were desperately needed. The Solarian fleet, with a score of other fleets that had come from its immediate neighborhood, was being sent to the other side of the galaxy, where a solar system with two huge planets, inhabited by two totally different ruling races, was being attacked by the invaders, who had recently gained possession of the interstellar matter-transmission apparatus on the outermost planet.

Down dropped the Solarian fleet to the transmission apparatus on the world at the edge of the galaxy, whose inhabitants reared those titanic structures that dwarfed the one which housed the transmitter. It seemed but a little while since they had left it to hurtle upwards, but years had passed. Now they were returning to be sent by that matter-transmitter into the galaxy again.

Few of the strange inhabitants of that world had time to spare to watch the endless lines of ships stretching far into space from the surface of their world, many of the larger ships bearing marks of that encounter, as they waited their turn to enter the vibration chamber of the transmitter.

The leader of that world congratulated the commanders of the fleets and wished them good luck in the far-off regions where they were going. The busy populace spared a few moments to add their well-wishes to that of their leaders'. If the center column had not been destroyed, their solar system would now have been in possession of the invaders.

Ahead of the Solarian fleet was a fleet of cone-shaped ships from the solar system of Mu Cassiopeia. Behind them followed the thin disk-shaped ships flying on edge from the Solar system of Altair, and in the distance came the cube-shaped ships from Tau Ceti. Swiftly the cone-shaped ships were being swallowed. A fleet of ovoid-shaped ships had preceded those cones.

Again the great opening of the matter-transmitting apparatus yawned for Don Stelite's ship. The last of the cone-shaped ships had disappeared.

Indescribably brilliant flashes of light greeted the Solarians on emerging from the vibratory chamber of the receiving mechanism. Massive artillery stationed near the transportation structure were pouring into the heavens steady streams of projectiles. Rays, some of them visible by the attendant fluourescence in the planet's thick atmosphere, reached upwards like death-dealing swords and dealt death in many forms.

Ships enveloped in glowing shells of incandescent gases fell continuously and were rayed out of existence before they reached the ground. The void beyond the atmosphere were full of ships rushing furiously at each other. From a planet visible near the horizon came a steady stream of Magellanian ships to swell the number of those attacking, while from the huge transportation mechanism on that world ships bearing the emblem of the Confederation hurtled up in an unending stream.

Fast behind the rearmost ranks of the cone-shaped ships from Mu Cassiopeia rose the vanguard of the Solarian fleet. Dodging, plunging ships, deadly rays both visible and invisible, shells loaded with atomic-explosives and other lethal forces, the vanguard of giant Solarian ships shot upward.

Swiftly were the fleet of cone-shaped ships ahead of the Solarian fleet being wiped out. None of the ovoid-shaped ships that had preceded the cones were to be seen.

The Solarians were ordered to clear the way for the fleets following.

Wave after wave of Solarian ships manned by the still hot-headed youth of the human species threw themselves upon the Magellanian ships and forced them back by the sheer madness of their attack. Grudgingly did the invaders give space, each ship-length bitterly contested. Such fury they had seldom encountered. If they had not been able to make out the forms of men silhouetted against the observation windows, they would have thought that those slender, torpedo-shaped ships were manned by machines, not living creatures.

AT the head of the Lunarian legions came the large ship bearing the crest of the Lunarian leader. Not yet had their mettle been tested. Forward the ship leaped and behind followed the forces of Luna in their tiny lightning-fast ships. The Lunarian leader gave an order and ahead shot tens of thousands of those tiny ships. Seemingly loath to be outdone by the human species, the Lunarians plunged even more recklessly at the enemy.

Now were those tiny ships coming into their own! In the relatively crowded space within the confines of that solar system, the larger ships of friend and foe were so intermingled, that the mighty disintegration rays seldom dared be used. Any object traveling in the neighborhood of one hundred miles per second suddenly arrested was almost as destructive as a powerful disintegration ray or atomic bomb.

They threw caution recklessly aside. Dodging rays, twisting around ships bearing the faintly luminous emblem of the Confederation, with little room to spare, the tiny space ships flashed at the slowly withdrawing Magellanian ships with swiftly increasing velocity. Disregarding their low-powered rays entirely, they used their tiny ships as projectiles. It seemed as if each of the Lunarians at the controls of those tiny ships was more than willing to sacrifice himself, if he could but destroy or disable one of the larger of the invaders' ships.

When those tiny ships began smashing into them from right and left, from below and above, the gradual withdrawal of the invaders became a retreat.

Ahead, ever ahead, battled the ships bearing the crest of the leader of Luna's forces. Before it, ship after ship fell crumpled or disintegrated.

Into the very heart of that raging inferno plunged the huge Lunarian ship with thousands of tiny ships following. The Lunarian leader gave another order and like streaks of light the tiny ships behind him, the last of the Lunarian legions, swept into the mêlée. The larger ship followed as best as it could.

Past a huge cone-shaped ship, battered almost beyond recognition, that was struggling grimly with a giant Magellanian ship whose driving mechanism had been shorn off by some powerful ray, the Lunarian leader's ship darted. An instant later it hurtled above a score or so ovoid-shaped ships that had preceded the cones, all that was left of their whole fleet. Everywhere there were groups of ships literally tearing each other to pieces. No quarter was asked or given.

Suddenly, in front of the Lunarian leader's ship, there appeared a lone Magellanian ship. Sighting the Lunarian ship, it hurtled forward. The Lunarians, in turn, caused their ship to leap eagerly onwards. From the nose of the Lunarian ship there stabbed ahead a powerful disintegration ray. Lesser weapons mounted at various points of its long length were ready to rake

the enemy as soon as it came within range. A battery of silent solenoid electric-cannon, following the approaching ship, sent forth streams of steel-jacketed missiles.

The two ships raced toward each other. From the Magellanian ship there swept forward a powerful beam to neutralize the ray from the Lunarian ship. Other vibratory weapons it brought into play. The forward part of the Lunarian ship began to glow red as a heat ray was concentrated upon its nose. Following that heat ray, a peculiar pulsating series of vibrations traveled through the Lunarian ship. The Lunarians manning it began to act strangely. At regular intervals their bodies jerked curiously, then limply relaxed.

The Magellanian ship, to avoid head-on collision, swerved sharply. As it passed, it blazed away with other weapons. A number of sharp shocks shook the Lunarian craft.

Just as the Magellanian ship was turning to finish the helpless vessel, a huge cube-shaped ship appeared suddenly, as if out of nowhere, and rayed the invader out of existence. At the instant the Magellanian ship ceased to exist the force that caused the crew of that Lunarian ship to stiffen and relax fell from them. A number of the crew were detailed to investigate the damage. The ship answered to its controls.

By the time the Lunarian ship had crossed that region, the actual battle had moved far off to one side. From where it was, those within could make out with their powerful space-penetrating apparatus a plunging mass of Solarian ships still sweeping everything before it. Behind, those Solarian ships began to gather huge disks from Altair, mighty cubes from Tau Ceti, great spheres from blue-white Vega, while from the atmosphere of the world behind began to emerge the first of the torpedo-shaped ships from Xi Ursa Majoris.

Fast were the ranks of the Solarian fleet being thinned. Full upon them were the Magellanian's engines of destruction being concentrated. Disk-shaped ships from Altair plunged in to fill each gap as it appeared.

In the rear of the Magellanian ranks, a huge force of their ships were gathering. Their front ranks opened and forth poured an irresistible force of ships. Halted at once was the forward sweep of the Solarian fleet. The ships bearing the emblem of the Confederation, after a desperate stand, were swept back.

Ever swifter did the Lunarian leader drive his ship toward that bitterly contested region of space. Seldom were the brilliant flares that marked the plunge of tiny Lunarian ships into the larger craft of the enemy now to be seen. Those within that large Lunarian ship knew that few of their tiny ships remained.

The tide of battle had turned against the forces of the Confederation in that solar system.

UP alongside of Don Stelite's ship at the very forefront, where rays and missiles fell thickest, a huge disk edged. Following it crept a mighty cube. They paused beside the giant Solarian ship. The identification marks on the disk showed that Zerbin of Arete 6 commanded it.

"Biped!"

"Is that you Zerbin?" Don Stelite's mind questioned, as his hands hovered an instant above the control-board.

"Yes, biped. Our forces are being pushed back, but my ship goes forward. Aaxo of Planet 2 goes with me."

"It is suicide."

"I know."

"Better death," the thoughts of the Tau Cetian broke in sharply, "than to face the ignominy of retreat."

"I will go with you."

"We knew it, biped. Let us start."

From far off to one side the Lunarian leader saw three ships, a giant torpedo, a huge disk, and a mighty cube, suddenly leave the ranks of the retreating ships and go plunging fearlessly toward the advancing wall of Magellanian ships.

"If death is so hard to face," Aaxo of Planet 2 sent his thoughts back coldly, "we will show you how to die!"

Each captain of the retreating ships seemed to feel that to him personally was the message directed. Shame gripped them for a moment as they watched the three ships dart with ever-increasing speed at the enemy. They, too gave orders to move forward.

Fast was the ship of the Lunarian leader approaching that region of battle. As he drew near he wished that his ship had been one of those three.

In front of the Lunarian ship there appeared a giant Magellanian ship. Its mighty disintegration ray was sweeping toward the ship from Luna.

The Lunarians at the controls tried to swerve their craft from the path of the approaching ray. Compared to that mighty ray, their own powerful beam of molecular destruction was indeed puny.

Down upon the doomed ship the ray swept. Without any warning the hum of the driving mechanism within the Lunarian ship ceased. An instant later the ship was plunged into darkness. No longer did it answer to its controls.

The mighty cube commanded by Aaxo of Planet 2 was the first of the three ships at the head of the Confederation's fleets to meet annihilation. A missile containing atomic-explosives penetrated four of its ten thick outer shells and exploded. A few seconds later the concentrated rays from a number of Magellanian ships wiped out of existence the disk commanded by Zerbin of Arete 6. The slender Solarian ship still kept on. All around it rays and missiles flashed. A moment later its nose glowed red as heat waves enveloped it, then it shook as if under the impact of powerful blows; still it plunged forward.

Irresistibly were the ships bearing the emblem of the Confederation following that lone ship. The Solarians, at the very forefront, fought as they had never fought before. The more furious the struggle became the more the men and few surviving Lunarians seemed to enjoy it. Centuries of suppressed instincts were finding an outlet. The reckless Solarians made a game of death. Certain members of the crews aboard the larger ships kept strict count of how many times they escaped destruction by a hair's breadth. The few remaining tiny Lunarian ships played a game of their own, marking their score so that all could see—a sudden burst of flame in which their ship met instant annihilation as it plunged into the vitals of a Magellanian ship.

Back across those millions of miles of interplanetary space to that outermost planet were the invaders driven. Wave after wave of ships threw themselves upon them. Back they were forced, back and back. Just outside of the atmosphere of that outermost planet, the invaders were forced to halt by the press of reinforcements pouring up steadily from below. Unable to move either backward or forward, they fought like fiends.

Enveloping that planet like a shell, the fleets of the Confederation began to contract. With desperate fury the invaders sought to break through. Each time they were driven back. But it was not until a great sphere from Vega plunged through the closely packed ranks of Magellanian ships and destroyed the matter-transmitter on that outermost planet was the fate of the invaders in that solar system sealed.

BROKEN had been the surface of that world before the coming of the Confederation's fleets. Now mountains rose and fell like waves on an angry sea. As a tortured creature, did that world shrink and writhe under those mighty blows.

Not a structure remained standing on that planet when the rain of crashing projectiles and concentrated heat waves finally ceased. To make sure that those metal-clad invaders and their ships were wholly wiped from that battered world, thousands of small ships dropped into the atmosphere to examine every square foot of its surface. No sign of life could they find.

The fleet of globular ships from the solar system of Vega were despatched out beyond the outermost planet to overtake and destroy any of the Magellanian ships that might have sought to escape by flight. The remaining fleets were split into two forces—one whose task was to destroy any of the wrecked ships belonging to the invaders, the other was to investigate all wrecks bearing the Confederation's emblem and rescue the survivors.

A darkened wreck was rushing swiftly toward the sun of that solar system. No sign of life could be noted about it as it was drawn toward its doom. At the speed it was traveling, it would soon enter the fiery embrace of that sun and be reduced to a mass of glowing vapor.

It was a Solarian ship, though it bore little resemblance to one. The rear part containing the driving mechanism and power generators was gone, cut cleanly off by a powerful disintegration ray, while the forward end was so seered by heat and riddled by darting missiles that it resembled nothing but a shapeless mass of metal. Somehow, the identification marks on one side of the forward end of the wreck had escaped the onslaught of the destructive forces that had brought it to its present state. Under the Confederation's emblem could still be made out part of the faintly luminous crest of the Lunarian leader.

There was life aboard that Lunarian wreck. In the control room, just back of the pilot chamber, a few living creatures still were conscious. Only those who had been in the control room at the instant when the ray had sheered off the rear part of the ship, one of them was the Lunarian leader, still lived. With the cutting off of the power supply of the ship all air-tight doors had automatically closed.

Over and over the wreck was turning as it hurtled toward that sun; for, following the destruction of their source of power, the stabilizing gyroscopes in the center of the ship had ceased to spin. The Lunarians tied themselves down to whatever solid object they could reach to prevent themselves from being thrown about.

Each passing moment saw the chance of rescuing those Lunarians grow less as the wreck rushed with ever-increasing speed toward the flaming sun. All means of communication, except a small emergency set, was dead. While the battle raged it was useless to even try to get aid. With a forlorn hope that the struggle was over, they started the small transmitter.

Slowly were the fleets beginning to assemble in the void of space between the orbits of the two planets of that solar system. Practically all the Magellanian wrecks and those that had sought to escape by flight had been destroyed. The ships sent to rescue the survivors of the wrecks bearing the emblem of the Confederation were returning.

DON STELITE'S ship, seared by heat rays and criss-crossed with long scars where countless fragments of exploding ships had grazed it, nose partly melted away, driving generators loose in their beds, walls cracked and air leaking through, yet still able to travel, was being driven back and forth by its commander, who was searching frantically for his Lunarian friend. A message sent by the small emergency transmitter aboard the Lunarian ship had been picked up by a great sphere from Vega and passed on to the Solarians. The message, repeated at intervals for a short while, gave the approximate position and condition of the wreck.

Nearer and nearer to the flaming sun of that solar system Don Stelite drove his ship. It was very close to that sun. Through the multiple walls of the ship the heat was beginning to penetrate. Suddenly a Solarian distress call was picked up. Its position was checked and toward it the badly battered giant torpedo flashed.

The ship calling for aid was not the Lunarian vessel. As quickly as possible the crew of that disabled ship was taken off. Inquiries amongst the rescued men brought to light information regarding the ship that was sought. One of the officers recalled seeing part of a Solarian ship, that bore the crest of the leader of Luna's forces, pass. The sun was drawing it to itself at a tremendous speed.

Though it was exceeding dangerous to approach any closer to the sun, Don Stelite ordered his ship forward. The temperature within was mounting rapidly. A black spot was sighted. Swiftly did the giant torpedo overhaul it. Those on watch by the observation windows, protected by thick screens against the fierce glare of the nearby sun, saw that it was part of a Solarian ship. It was revolving slowly as the powerful gravitational pull of the huge luminary drew it to itself. As it turned over a portion of the crest of the Overlord of the Elder City was made out.

The search was ended!

Luckily the wreck had been sighted when it was. Only a few moments more, at the utmost, could Don Stelite's ship have continued toward that sun. The part of the ship facing that gigantic mass of flame was already beginning to glow red. Though its refrigerating system was working at top speed, the temperature within had risen to a dangerous point.

No sign of life came from the wreck. Their signals remained unanswered. Wasting no time the giant torpedo drew the Lunarian ship out of that region as rapidly as possible.

With a sinking heart Don Stelite, recalling how high the temperature within his own ship had risen despite the fact that its refrigerating system was working at its greatest speed, gave orders to board the wreck. He went first. Lunarian dead were everywhere. They were gruesome to look upon. The temperature in this ship had risen above the boiling point of water. In the control room he found his Lunarian friend and some members of the crew.

Averting his gaze from the ghastly thing that had been his friend, Don Stelite hurried from that chamber. With as much speed as his bulky pressure-suit would allow, he rushed down the long corridors and chambers with their heavy doors until he reached a jagged opening that showed space beyond. Through that opening he leaped far from the wreck and shot toward his own ship.

Casting the wreck with its burden of gruesome dead adrift, the battered giant torpedo darted back toward the region where the fleets had gathered. The crews of the assembled fleets were in space swarming about their ships, from which streamed tiny figures pushing huge plates of thick metal and machinery with which to repair the jagged outer walls of their ships. The battered newcomer, drawing near the Solarian ranks, was ordered to do likewise.

Barely had the fleets patched up the outer shells of their ships and other vital parts that had suffered harm.

when orders came to them to reenter the transmitter on the inner planet. Another solar system was threatened by the invaders.

Into the transmitter on that inner planet began streaming the first of the fleets of the force of which the Solarians were part, and then out of another transmitter in another solar system near the center of the galaxy they began pouring. There they found other fleets waiting, some three score, that had been sent to make sure the invaders were quickly crushed. The force of which the Solarians were part took their place behind the waiting fleets.

Learning through their scouts of the great array that was sweeping out to meet them, the invaders turned and fled back in the direction of the solar system from which they had come. In pursuit streamed the fleets that bore the emblem of the Confederation.

The invaders kept their lead. Time passed, but the distance between the two forces seemed neither to lessen nor increase. Too far ahead were the invaders for the rays of the pursuing fleets to reach them. One advantage had the Magellanians, and that was to be able to strew clouds of huge shells, loaded with their most powerful destructive agents, in the path of the pursuers. Although most of them were rayed out of existence before they could do harm, a few slipped through to spread destruction. Even the largest of the giant space ships encountering those missiles was doomed to utter destruction.

For the fleets of the Confederation it settled into a grim chase. Quarter of the distance to that nearby star was slowly crossed, then half; still the gap between them seemed the same.

The clouds of missiles the invaders dropped back thickened. More and more of the pursuing ships met them head-on. Suddenly, a ship flying above and slightly ahead of the giant torpedo that Don Stelite commanded, burst into a mass of blinding flame and flying metal. No time for the nearer ships to dodge! A huge fragment struck the stern of Don Stelite's ship, going through like a flash, and wrecked the steering mechanism in its swift passage from top to bottom of the ship. The shock caused the nose of the disabled craft to swerve sharply up, narrowly missing ship after ship in its path as it headed in a course all its own. Before it could be brought to a stop, the fleets of the Confederation had not only disappeared out of sight, but also out of range of its sensitive, matter-detecting instruments.

Don Stelite, reporting what had occurred, received orders to make temporary repairs and follow in the wake of the fleets.

The damage, judged by the first rough survey, was thought to be slight. Later and more thorough examination showed that such was not the case. One of the main driving generators with its mighty power unit, besides the steering mechanism, was a mass of fused and twisted metal. A great jagged hole showed where the fragment had entered.

The ship's outer walls would have to be patched up first. Men in their pressure-suits began pouring out with their tools to begin that task. Days—Earth-time—slipped into weeks, then a month, still the damage was not wholly repaired. Three months passed before the ship finally could proceed.

In the direction of that nearby star moved the lone ship. Swifter and swifter it sped. Time and space slipped smoothly by. Brighter grew the star toward which it was heading, brighter and brighter.

The force of which the Solarians were part was still pursuing the invaders. Nothing of any special importance had occurred. Then Don Stelite, in his lone ship far in the rear, listened in on a message from the fleets ahead telling that the invaders, nearing the solar system toward which they were fleeing, were bringing their ships to a stop as if preparing to make a stand. A little while later reports, going back to the Supreme Council, told that the fleets of the Confederation, maintaining their great velocity, were about to smash into the waiting ships. Then the front ranks struck, becoming instantly the center of a seething maelstrom of destruction that ever widened.

For a long time after that message there was silence, broken, at last, by another voice. But hardly had the voice identified itself before it was drowned out by a torrent of rumbling and groaning sounds that issued from the receiver. Then abrupt silence. It did not augur well for the fleets of the Confederation.

As the lone torpedo drew near that star, those within saw plenty of signs of a terrific struggle. Wrecks and massive fragments of countless ships darted aimlessly about. No sign of life came from those broken ships. Thicker grew the mass of wreckage as the torpedo continued to approach that star. Wrecks bearing the emblem of the Confederation were just as numerous as those without.

It was becoming increasingly more dangerous each moment for the torpedo to continue to make its way into the ever-thickening mass of wreckage. Many of the hulks were darting about at terrific velocities. Though the ship was equipped with automatic devices to prevent collision, they were practically worthless in that crowded area or against objects traveling above a certain speed. Therefore, those on watch, knowing that if their attention were diverted for a moment it might mean instant death, kept tensely alert.

Nearer to that star the torpedo crept, and nearer. The wrecks began to thin out. It came to a region that was comparatively free of those flashing hulks. Ahead, about the distance it would take light eight days to cross, lay the star. No sign of any of its family of planets could yet be made out.

The greatest of space-penetrating apparatus aboard the ship swept the region. At last a planet revolving about that star was made out. Toward it the torpedo moved. Larger grew the planet's disk in the observation windows. A halo surrounding the disk showed that it possessed an atmosphere.

Warily the torpedo moved nearer. The men manning the ship's mighty engines of destruction were tense. The great space-penetrating instrument showed the surface dotted with huge structures. It also showed immense pits and large glazed areas, where explosives and heat rays had struck. No ships or rays swept out to challenge the torpedo.

Slowly the ship crept closer. The world below might be a trap. It halted just outside of the atmosphere. There was no sign of life on the world below. A score of men in their pressure-suits, armed with tiny atomic-bombs, dropped down at various points. They reported that the world was deserted.

The giant torpedo moved closer to that luminary. Other planets had been sighted. Toward the next, the ship sped. Signs of terrific bombardment were everywhere about its surface. Mighty cities had once evenly dotted the surface of that planet, but now many of them were so battered to the ground that not a structure remained standing. Men dropped down to investigate. It was also deserted. Most of the automatic machinery in the structures still standing on that world was still running. It seemed as if the inhabitants had intended to return.

Leaving the second planet, the ship moved to the next nearest. It was more battered than the other two. Huge

masses of metal, shattered space-ships, lay thick around high mounds of masonry and metal that had been the largest cities on that world. The ruins of a huge matter-transmitter could be made out near one of the largest mounds of masonry. That world, too, was also utterly devoid of life.

Three more worlds were visited by the torpedo. On two of them, as on the other three, no sign of life could be found. On the third and nearest to the luminary of that solar system yet visited stood a huge matter-transmitter. Dwarfing any structure still standing on that world it rose mountain high. Near it lay vast heaps of fused and twisted metal composed of shattered space-ships. In the distance, circling that transmitter like a chain of mountains, lay a ring of smashed ships piled high. On top of one of the vast heaps near the transmitter, a giant Solarian ship could be seen lying broken across a Magellanian ship.

As if by a miracle, the structure housing the matter-transmitter had escaped destruction. The surface, for miles surrounding it, bore evidence of having been much churned by showers of mighty projectiles.

Men dropped down to that vast structure to see if any living creatures were in it. As they drew near, they heard the mechanism of the transmitter running—smoothly! Stealthily they landed on and near the mountain-like structure. No sign of life could they find.

Another group of men was dropped on the broken Solarian ship. They reported that none of the crew was alive. The ship's log showed that the Magellanians, fighting grimly, had been beaten back to that world. They had begun to retreat into the transmitter. That was the last entry. No doubt the fleets of the Confederation had followed the invaders into that transmitter and had gone out into some far-off solar system.

Don Stelite, after recalling the men, was about to order his ship to proceed back to the solar system from which the fleets had come, when a badly battered Magellanian ship tore itself out of one of the heaps of shattered ships and sped straight for the transmitter. As the Magellanian ship drew near the transmitter it blazed away at the torpedo with its weapons. Though the range was almost point-blank, it missed again and again. Before the Solarian ship could reply with its own weapons, it had disappeared into the huge structure. The hum of the transmitting mechanism within rose to a shrill scream, dying swiftly down to a low hum again, then it was gone.

After it flashed the torpedo. The mouth of the transmitter yawned wide. The indistinct impression of being torn asunder caught the crew in mid-breadth, followed next instant by the process of being reassembled. Then out on a jagged world, so jagged the men peering out of the observation windows could scarcely believe it possible, the ship moved.

Up and away from the broken surface the torpedo rose. A dull red ball glowing balefully in the heavens bathed the receding surface. No atmosphere of any appreciable density enveloped that world. Its jaggedness bore mute witness to the terrible bombardment it must have been subjected to. The only structure still standing was the one that housed the transmitter. An artificial mountain of metal leaning over the vast structure had protected it from destruction. Several deep cracks criss-crossed the portion of that mountain of metal leaning over the transmitter, and, as the torpedo moved away, a huge section dropped upon the transmitter, crushing it.

Some of the members of the crew stationed near the observation windows, gazing out into the surrounding blackness as the ship moved away from that battered world, were troubled for a moment by a vague sense of familiarity, then came the realization that they were at the edge of the galaxy once more!

The feebly glowing sun and its jagged planet seemed to comprise that whole solar system. Behind that dying star, about three light-years off, was a compact cluster of old red stars.

IN the distance the ship the torpedo had followed into the transmitter was sighted. Away from the galaxy, with swiftly mounting speed, it was hurtling. After it darted the torpedo. From the Magellanian ship a powerful disintegration ray swept back. It was met and neutralized by a beam of equal strength streaming from the nose of the torpedo. The crews of both ships began to bring other weapons into play.

The men handling the torpedo's lesser engines of destruction were just beginning to get the range when the ship in front was seen to dodge madly. Not from the weapons of the giant torpedo in the rear was it dodging so wildly, the next instant showed that; all of its weapons, even those on the bulge of the ship that had been trained over the stern, were being turned ahead. Then in front of the Magellanian ship appeared a number of specks, that rapidly grew into space ships. They were of a dozen different shapes. Too far away to see if they bore the emblem of the Confederation were those distant ships. As they drew near the dodging Magellanian ship in their path they suddenly concentrated their rays upon it, destroying it instantly.

Behind those ships, there were about five score; other specks began to materialize. At first only about a thousand could be made out, but behind them came tens of thousands more. From that thousand or so specks in front of the others, vibrations of all frequencies streamed toward the five score nearer ships. Even as those aboard Don Stelite's ship watched, fully half of those five score ships disappeared in puffs of hazy light as powerful disintegration beams picked them out. Desperately the remaining ships flung a barrage of destructive vibrations back at the distant specks.

Don Stelite had ordered his ship to slow down the instant the specks in front had been sighted. Now it was ready to dart in any direction.

One of the men at the eyepiece of one of the mighty telescopes aboard the torpedo reported that he made out the Confederation's emblem on the nearest of the fifty or so odd ships. The Confederation's cryptic symbols underneath the emblem showed that the cubes and disks had come from Tau Ceti and Altair. When those cryptic symbols were deciphered, they realized that those few fleeing ships were the sole survivors of the scores of fleets of which the Solarians had been part.

Don Stelite tried to get in touch with the approaching ships with the aid of the torpedo's powerful communicating apparatus, but all that issued from the instrument was a torrent of rumbling and grumbling noises that could not be tuned out. Delicate instruments showed that the discord came from the specks in the rear. The invaders had undoubtedly found out the narrow vibratory band used by the ships of the Confederation for purposes of communication and made communication by that means an impossibility.

From one of those approaching ships bearing the emblem of the Confederation, a powerful mentality sought out the captain of the giant torpedo. It demanded imperiously that he identify himself.

"Don Stelite, captain of space battleship No. 162 of Fleet No. 27,040," was the prompt telepathic reply.

"Your fleet belonged to our force. What is your ship doing here?"

Swiftly Don Stelite told of the accident which caused him to follow the Magellanian ship into the transmitter.

"Is the matter-transmitter in the nearby solar system still unharmed?"

"No."

"Then turn your ship about and head for the cluster of red stars behind the nearby dying sun. Drive your ship at a velocity it has never been driven before. You must reach that cluster, for you have undoubtedly already discovered that your communicating apparatus is useless, and warn them that a mighty host of the invaders is approaching. Your ship is too far ahead for the invaders to have detected you with their instruments. We, the last of the force of which your fleet was part, will attempt to hold the foremost of the invaders back while you make your escape."

Don Stelite hastened to obey. The torpedo swung sharply about and headed for the cluster. Faster and faster it sped. The two score and ten ships behind were going down one by one. Soon the last one was destroyed. The thousands of specks in the distance were growing larger.

Swiftly the torpedo gained velocity. The specks in the distance no longer grew larger. For a while the foremost of those far-off Magellanian ships remained about the same size in the eyepieces of the great telescopes; then they began to grow smaller as the torpedo, straining its driving mechanism to the utmost, drove onward with increasing speed.

At first no message could be sent nor received on the torpedo's powerful communicating set, for the rumbling and grumbling continued to drown everything else out. But as the distance between the torpedo and the Magellanian ships increased, the blanket of interference laid down upon the communicating channel grew weaker. At last the discord could partially be tuned out.

Don Stelite then tried to get in touch with the cluster. The sound vibrations, impinged upon gravitational lines of force, bridged the gap in an instant. After two or three attempts, communication with one of the solar systems of that cluster was established. Identifying himself, he began to warn them of the approaching host.

The warning was immediately relayed to the Supreme Council. After checking the position of that lone ship, they dispatched a fleet of swift scouts in its direction.

Ever toward that cluster hurtled the torpedo. Brighter grew the outermost fringe of dying stars composing it. The matter-detecting instruments aboard the torpedo acted strangely for a while, then went dead. No known cause could be assigned to the failure of those sensitive instruments. Suddenly, between the slender Solarian ship and the red stars, darted a long line of Magellanian ships. Before the torpedo could slacken its speed or swerve, it was in their midst.

About the torpedo closed the nearest ships of that line. Not daring to use their powerful disintegration rays for fear of destroying their own ships, the invaders concentrated heat rays and other vibrations upon it. But the crew of the torpedo, having no such fears, were determined to sell their lives as dearly as possible. In an instant every weapon aboard that torpedo began to vomit death and destruction. Ship after ship surrounding it, riddled, fell away, others disappeared in hazy puffs or became fused masses of metal.

Back from that slender ship, which was blazing a swift path of destruction through their lines, drew the nearest Magellanian ships. Open space was just beginning to show ahead of the torpedo when a series of vibrations penetrated metal walls and caught the crew in their grip. The torpedo became strangely silent.

Suddenly, through the galaxy, raced word that another part of the main Magellanian column that had split into three parts had been sighted by a fleet of swift scouting ships that had been sent out to verify a warning received from a ship claiming to be the only survivor of Fleet No. 27,040.

When that part of the column had been sighted by the scouts, it was close to the cluster of old red stars, heading in its direction. That cluster was very compact, eighty-three solar systems crowding within a sphere a little more than three light-years in diameter. In that cluster were hundreds of planets inhabited by races who were some of the oldest of the original members of the Confederation. The solar system, which the Supreme Council had made its headquarters, was in the very center.

Guarding that red cluster was a mighty force of ships.

Ready were the allied races of the Confederation to turn their attention wholly to the invaders outside of the island universe. Most of the Magellanians within the galaxy had been overwhelmed when the fleets that had destroyed the remnant of the center column had poured down upon them from every direction. Only within a few score isolated solar systems in which the invaders had cut themselves off from their own kind, as well as the forces of the Confederation by shutting down the matter-transmitters, did they still retain possession of the worlds they had captured. The Confederation would attend to them later.

Again did the Supreme Council order the allied races of the Confederation to send forth their legions. In answer to that summons, they began to pour from a myriad points.

Steadily, new streams of ships, the flagships bearing the curious crests of their commanders emblazoned below the emblem of the Confederation, poured out of the solar systems at the edge of the cluster, facing the approaching Magellanian column, and rushed into space. On each of the planets of those outermost solar systems there was at least one huge matter-transmitter. Space in front of those red stars swiftly began to fill up with countless fleets of mighty ships.

Even the human race had prepared another fleet, Lunarian volunteers manning a number of ships, and was sending it forth. Terribly did the transmitter at the southern tip of Earth whine as ships flowed steadily into it. Out of another transmitter at the edge of the galaxy they were pouring. An orange-colored sun glowing feebly near the horizon of that world greeted them. Up through a blood-red atmosphere the slender Solarian ship climbed—and out into space.

Not unnoticed had gone the mad, resistless sweep of the first Solarian fleet when called upon to clear the way for the fleets following in that solar system having but two planets. Seldom did the races of the Confederation display such utter fearlessness when attacking the dreaded invaders. Winging through the galaxy had gone the tale of their irresistible fury.

The second Solarian fleet, because of the reputation achieved by the first, was assigned to a place well up in the forefront of the swiftly growing assemblage of fleets. As it swept out to take its place, it passed fleet after fleet of every shape and size. Bright and new did the ships of most of those fleets gleam, though scattered among them were fleets of battered ships, veterans of many a desperately fought battle.

Scouts and tiny swift ships equipped with television apparatus hovering near the Magellanians kept the Supreme Council supplied with information as to their every move. The second third of the invading column was drawing rapidly near the cluster, being at the time when the fleets began to emerge at the edge of the galaxy to meet the myriads of ships that composed it, barely a half a light-year distant. Though its speed

was almost equal to three-quarters that of light when first sighted, its terrific velocity was beginning to drop. It was plain to see that those that commanded it intended to wrest the cluster from the allied races.

That third of the invading column was too near the cluster to be allowed to draw yet closer. Orders flashed through the vast assemblage that had poured outward from the galaxy's interior to stop them. There was a final shifting, then they began to leave the red stars behind.

For the first time the allied races actually began to see victory looming near. Even if that vast array of ships rushing outward should be wiped out of existence in halting the approaching third of the Magellanian column, the Confederation would not be entirely defenceless, for countless other fleets, among them a new type of ship, would by then be ready to take its place. Besides, the message bearing the call to arms was still being broadcast. New races were steadily joining the ranks of the Confederation. As fast as each new member could prepare its quota, it was sent out. A little more time, and the Confederation would be invincible. Then would the allied races turn their attention to the tiny island universes from which the invaders had come.

NOT of the destructive kind were the series of vibrations that penetrated the metal walls of Don Stelite's ship, just as open space appeared in front of it. They had only the power to temporarily paralyze the nervous system, either completely or partially, depending upon the organism, whose effects, governed by the organism's resistance, wore off slowly or suddenly. The effect upon the human organism was complete unconsciousness the instant those vibrations found their mark.

When Don Stelite recovered his senses, he felt a distinctly alien presence near him. Cautiously he opened his eyes. For a moment everything was blurred, then he made out a number of metal-clad beings standing about ten feet away. Also, he saw that he was still in the control room of his own ship. Thinking it best to feign unconsciousness until his mind cleared, he lowered his eyelids again.

Those metal-clad beings, judged by their thoughts, were apparently the surviving officers of the ships the torpedo had wrecked. Their conversation turned to a change in plans that those in command had made. Hope of conquering the galaxy with their expedition was abandoned for the present. Their aim now was to gain possession of the red cluster toward which they were heading. Their new plan called for the use of it as a base.

Then, one by one, they recalled defeat after defeat that they had suffered. If the races of the galaxy had not possessed their matter-transmitters, they would have fallen easy prey to this mighty expedition. With those matter-transmitters, the defenders could draw on their vast resources and concentrate them on the point being attacked. While the defenders grew stronger, they grew weaker.

But that advantage would be equalized when next they tried to conquer the island universe. A number of their swiftest ships would soon start for their own galaxy with information about the transmitters; also prisoners from which to wring other information. Time meant nothing to them, for they were, outside of accidents, practically deathless. When those ships reached their galaxy, their species, who inhabited its countless solar systems would begin constructing huge matter-transmitters resembling those built by the races of the Confederation. Then would their legions really begin to pour down upon the defenders, to destroy them.

The planets revolving about the red stars of the cluster would be used as a base, while waiting. In the interval they would dot the surfaces of those worlds with huge transmitters. But first they would have to conquer the cluster.

One of the metal-clad beings left the group and moved over to where Don Stelite lay.

"This is the last one," the being beside Don Stelite put his thoughts into words of his own tongue and addressed them to the others. "He seems to be the one who commanded this vessel."

"It is hard to tell," another spoke up, "for none of the creatures who manned this vessel wore any insignia to denote his rank."

"I would like," said the one who stood beside Don Stelite, "to bring him back to consciousness. If his thought processes are the same as ours, and if his nerves transmit pain, I know that I can force him to divulge whatever he knows."

"Not now," one, who was obviously in command, broke in. "You know that the orders are to place the crews of all captured vessels in the state of suspended animation so as to conserve their feeble spark of life as long as possible. All prisoners are to be transported to our own galaxy, where our scientists, first forcing them to give up all knowledge they possess, will experiment upon their living bodies until they discover a force that, while harmless to us, will be destructive to them. That force will then be propagated through their galaxy to rid it of all life."

"Are we to operate this captured vessel back to our own galaxy?" the one who stood beside Don Stelite asked.

"Yes," the one who seemed to be in command replied. "And during the long ages going back you will have plenty of time to bring him back to consciousness for a period long enough to satisfy your curiosity."

Don Stelite was nerving himself to spring to his feet, with the idea of somehow reaching the ship's communicating apparatus to warn the cluster of what he had learned, when metal tentacles gripped and turned him upon his face. He tried to struggle free, but was powerless to move. Desperately he flung his thoughts out to warn some member of the Confederation. Even as he did so he felt that it was useless. A sharp instrument was beginning to penetrate the back of his neck. The next instant a deep blackness settled slowly over his mind. But, in that instant, he felt the Two back on Earth reach out to him and empty his mind.

As the fleets sped outward, word came from sentinels patroling a portion of space at the opposite side of the cluster saying that they had sighted a solid mass of ships approaching them at terrific speed. Suspecting them to be the vanguard of the remaining third of the invading column, the sentinels, going to certain death, darted closer. They were Magellanian ships. As the distance lessened, they made out with their space-penetrating instruments, far in the rear of the vanguard—a countless host of ships.

It was the remaining third of the main invading column!

Dismay greeted that information. If there had been means, the races inhabiting the solar systems at the outskirts of the threatened cluster would have abandoned their worlds and migrated to solar systems far from the galaxy's edge, but the matter-transmitters were now needed more than ever to transport every available ship outwards.

That remaining third was even nearer than the other, barely a quarter of a light-year off. Too near was that force for the Confederation to send out enough ships to hold them off from the solar systems in their path.

Therefore, to prevent the solar systems from falling into their power to be used as bases for further operations against the defenders, an order was issued to destroy the planets of all solar systems in its path. Fleets of huge ships began issuing from the transmitters in the solar systems to be sacrificed. It would be the task of each fleet to tear a planet out of its orbit and hurl it into the dying sun in the center. A mighty outrush of blinding flame would follow, enveloping the rest of the planets.

When it was learnt that there was time only for a limited number of inhabitants of each doomed world to be transported to other solar systems, panic threatened to start. The feeling of panic quickly gave way to resignation as those to be transported were chosen. Too long had self-abnegation been the rule of those old races for panic to take hold.

Nearer to the outermost solar systems of that cluster drew the remaining third of the main invading column. Though that vast host must have been visible from the nearer solar systems, no fleets sped out to bar its way. So unusual was it that there should be no opposition, that those in command became suspicious. Then, as their vanguard drew near one of the outermost solar systems, they learned why.

The invaders, manning the foremost ships of the vanguard, saw a fleet of giant space ships tear a planet out of its orbit and drag it faster and faster toward the glowing surface of that dying star. Warning the host behind to give that region wide berth, they swerved sharply from the zone of danger. As they did so, a spot of blinding light appeared on the red surface, spreading rapidly, then the surface began to expand at a terrific rate. Not until it was at least one hundred times its former diameter did the outward rushing shell of blinding flame begin to slow down. And, as the vanguard drew near other solar systems, they in turn flared up and became blinding novas.

Meanwhile, at the other side of the cluster, the mighty aggregation of fleets was drawing near the approaching second third of the main invading column. Both forces had scouts flung far ahead. Soon would they meet and clash.

From the transmitters on worlds belonging to solar systems within the cluster just behind those that were being sacrificed, there began to issue fleet after fleet of hastily gathered space-ships. A large gathering of fleets had already assembled when there began to pour forth long lines of titanic cylinders. Super-giant ships of space were those cylinders. Nothing like them had ever been seen before. It was not their mere size that set them apart. The allied races had other ships just as large. It was their armament. The whole forward end of each of those titanic ships was nothing but a single ray-projector of awful power.

All fleets were ordered to make way for them. Forward they hurtled until they were far in front of the gathering host. There, evenly spaced from each other, they formed themselves into a wall of ships one vessel thick.

Orders leaped from fleet to fleet. Outward to where the novas flared they began to move. From the projectors of the super-giant cylinders there began pouring forth an impenetrable barrier of etheric vibrations that disintegrated all matter united in molecular form.

The forces of the Confederation at the other side of the cluster sighted the approaching Magellanian host. In turn the invaders sighted the countless fleets of the Confederation. Never had they opposed such a force before. Numerous as their own host was that vast gathering of fleets that were sweeping out to them.

The closely packed ranks of giant ships that made up the vanguard of each force swiftly annihilated the distance between them. Rays, darting across the intervening void, clashed. Soon they were followed by ships meeting in headlong collision.

For a seemingly endless period of time they fought, neither side retreating. A maelstrom of flaming gases and flying metal began to spread in every direction for countless millions of miles. Each moment new fleets hurtled forward to add their quota of destructive forces. No chance was there for individual ships to duel with their rays and projectiles. It was fleet against fleet, and as such units they met their doom. Life and intelligence at the controls, seeing annihilation in front, went to meet it unafraid.

Both invaders and defenders fought more like mindless machines than beings endowed with reasoning. Death, swift and certain, was the fate of all who approached within millions of miles of the front ranks; still they drove their mighty space craft forward. For a time it appeared as if each force would annihilate the other. Then there came a falling off of the forces of destruction from the Magellanian side. The invaders were drawing back. Scenting victory, forward moved the host bearing the emblem of the Confederation. The invaders turned and fled.

In the meantime, on the other side of the cluster, the gathering of fleets of the Confederation preceded by the mighty cylinders were nearing the third division of the invading column. The front ranks of Magellanian ships were almost within range of those titanic cylinders. Another few hours and the rays would reach them. The mightiest ray-projectors the invaders possessed were mere toys in comparison to the single projector each cylinder carried.

The invaders, ignorant of their foe's new super-engine of destruction, swept confidently nearer to the force that was hurtling outward to meet them. Then the front ranks of the Magellanian ships came within range of those titanic projectors. As fast as they rushed within those rays, they were dissipated into their original atoms. Unable to come near enough to use their own weapons of lesser power, they turned and fled. Fully a quarter of their countless ships was destroyed before their column could swing round and flee.

Those in the lead of the fleeing invaders shifted the direction of their flight until their galaxies lay straight ahead, then their speed increased. The fleets of the Confederation were in hot pursuit. As soon as they reached their greatest speed it became impossible to overhaul them. The Supreme Council ordered the fleets back.

With the aid of paralyzing beams, a number of Magellanian ships were captured. The captains of those ships were brought before a representative of the Supreme Council. Coldly he sent his thoughts into their brains. They were to be given life and freedom. The Supreme Council had seen it fit to spare them so that they could deliver an ultimatum to the commanders of their own kind:

"If ever they dared send an expedition across intergalactic space again, the forces of the Confederation would not only utterly destroy their metal-clad species, but also destroy every world in their tiny galaxies, so as to prevent similar forms of life from ever spawning there again!"

THE END

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